NSL-4601

Near Seamless LCD

User manual

K5960047-02

BARCO

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1 About the manual

1.1 Contents of the user manual

This manual consists of the following chapters:

Chapter 1: About the manual

Chapter 2: Important notices, product safety precautions and package & storage

The chapter contains important notices and safety precautions providing essential juridical and technical information about the purchased product.

Chapter 3: About the product

Chapter 4: Installation

This chapter describes how the monitor should be installed and connected into the system. It incorporates the pin layout of all the connectors.

Chapter 5: Operation

This chapter describes the function and the general operation of all function keys and indicators. How to power up the unit, how to adjust brightness and other adjustments.

Chapter 6: Maintenance

This chapter contains the cleaning instructions of the LCD screen and the cover of the unit.

Chapter 7: Troubleshooting

This chapter lists some troubleshooting tips for common problems.

Chapter 8: Specifications

Chapter 9: List of abbreviations

Chapter 10: Addendum

The addendum contains the RS-232 communication protocol, applicable for the NSL-4601 panel**.**

1.2 Change record

Revision	Date	Description
00	Jul-09	Initial Release
01	Jul-09	Changes in RS-232 protocol addendum
02	Feb-10	Changed RS-232 protocol (compatible with NSL-4601 firmware version V3.00 and higher)

1.3 Notation convention

Following notations are applicable to this manual and should be respected throughout the manual.

WARNING:

Warnings – presented in this manual, provide information, which if not adhered to, may result in personal injury or death.

CAUTION:

Cautions – presented in this manual, provide information, which if not adhered to, may result in damage to the equipment.

NOTE:

Notes – presented in this manual, provide information, which emphasize points, significant to understand and operate the unit.

IMPORTANT:

Important – presented in this manual, provide information, which is important to highlight.

2 Important notices, product safety precautions and package & storage

2.1 Read carefully

IMPORTANT:

Please read the important notices and safety precautions, mentioned in the following paragraphs, carefully. They provide essential juridical and technical information about the purchased product.

2.2 Important notice

2.2.1 Copyright

© Barco n.v., All rights reserved.

The information contained herein is Barco confidential information. No part of the information contained herein may be disclosed outside of the organization of the recipient, its sub-contractors, and customers in any form or by any means and/or stored in a database or retrieval system without the prior written consent of Barco.

2.2.2 Technical accuracy notice

Although every attempt has been made to achieve technical accuracy in this document, we assume no responsibility for errors that may be found. Our goal is to provide you with the most accurate and usable documentation possible; if you discover errors, please let us know.

2.2.3 Federal Communication Commission (FCC) notice

This equipment has been tested and found to comply with the limits of an FCC class (refer to the technical specifications of the specific unit for more details about the corresponding class). These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

2.2.4 Warranty

During the warranty period, Barco n.v. will do all repairs free of charge (material and labor). The faulty parts or units have to be shipped freight prepaid to a Barco n.v. regional service center. Barco n.v. will pay the freight charges when the repaired parts are shipped back to the customer's site.
Damage of equipment due to improper use or negligence of the safety

precautions incorporated in this manual are not covered by this warranty.

The warranty does not include the following:

- *Any hardware or software item procured from a source other than Barco n.v. or their official agent or distributor and integrated by Customer or a third party into Barco n.v. supplied equipment.*
- *Any host or system configuration not explicitly supported by Barco n.v..*
- *Consumables such as projector lamps, dust filters, ...*
- *All software installed on the system, whether they are acquired from Barco n.v. or a third party. An exception is made for software delivered by Barco n.v. that would prove to be a cause for the malfunctioning of the hardware covered under this Agreement.*
- *If any payment remains outstanding from the Purchaser to the Seller.*
- *Normal wear and tear, use under circumstances exceeding specifications, abuse, unauthorized repair or alteration, lack of proper maintenance.*
- *In the particular case of LCD displays, to the case of image retention phenomena (shadows, dark lines and other image artifacts), that may result from a usage outside of the specification.*
- *Any failures resulting from an accident, negligence (such as but not limited to removing or deleting system files & licensed software product files), misuse, circuit failure or any change, damage due to fire, water, thunder or lightning, power failure or fluctuation, disruption of communication lines or due to force majeure, or any reason foreign to the equipment.*
- *Any specific services or procedures, asked for by the Customer, related to verification of repaired equipment.*
- *If several failures occur which are excluded from warranty due to circumstances such as fire and if Barco n.v.'s understanding that these circumstances may result in damage to other hardware under agreement, then Barco n.v. is entitled to terminate the contract. No fees will be paid back by Barco n.v. in this case. Inspection of equipment will be required prior to the continuation of this Agreement; the same terms and conditions as for the inspection prior to the contract apply.*

2.2.5 Trademarks

Brand and product names mentioned in this manual may be trademarks, registered trademarks or copyrights of their respective holders. All brand and product names mentioned in this manual serve as comments or examples and are not to be understood as advertising for the products or their manufactures.

2.2.6 Open source license

This product contains software components released under an Open Source license. A copy of the source code is available on request by contacting your sales representative.

See appendix A for details.

2.3 Safety precautions

2.3.1 Earthing

WARNING:

The display unit must be earthed correctly. Verify that the power cable is plugged into a standard 3-pin power outlet which is effectively earthed. When using extension cords, make sure that they contain a grounded connection. If in doubt, contact a qualified electrician. Ignoring this warning may lead to personal injury or death.

2.3.2 Electrical warnings and cautions

- Do not power the unit with other input sources as specified in the technical specifications.
- Always power-down the unit before disconnecting the power cable.
- Unplug the display unit from the power source when not in use.

IMPORTANT:

Immediately unplug if:

- the power supply cord is damaged.
- the unit has been dropped or the cabinet is damaged.
- the unit does not operate normally by following the operation instructions.

WARNING:

Do not remove the cover without authorization. Removal of the cover by non-qualified personnel can cause personal injury.

2.3.3 Environmental cautions

- Do not use the display unit in a dusty or damp room.
- Do not submit the display unit to heavy shocks and/or vibrations.
- Do not cover the display unit while in operation to avoid overheating.
- Do not expose to direct sunlight.
- Do not use the display at extreme limits of temperature and humidity range. Storage and operating limits are specified in the technical specifications of the unit.

2.3.4 Requirement for dusty environments

The room in which the display unit is installed and operational must be dust-free. The room must comply with a dust class of 8 or better according to ISO14644-1. If the room in which the display unit is installed does not comply with the dust class stated above, please contact Barco to discuss possibilities to protect the display unit against dust.

NOTE:

All construction, reconstruction, decoration activities must be completed before the installation and operation of the product.

2.3.5 LCD screen

- Do not apply pressure on the surface of the screen. If 'waves' are visible on the screen below the pressing object (e.g. finger), the pressure is already too high and the LCD may already break under these circumstances.
- Do not hit the LCD screen with hard objects.
- Do not rub the LCD screen with rough materials.
- Do not touch the LCD screen with hard materials. Hard materials can cause scratches on the surface of the LCD screen. Examples of hard material are: fingernails, pencils, pens and styluses, wooden, plastic or metal objects.
- While moving the display unit manually, hold the LCD screen away from your body to avoid scratching the LCD screen.
- Do not paste or stick objects with glues and/or adhesive tapes on the LCD screen.
- Wipe off water droplets or oil immediately. Ignoring this precaution could lead to staining and/or discoloration of the LCD screen.
- Do not expose the LCD screen to direct sunlight.

2.3.6 Cover

- Do not place objects on the cover.
- Do not spill fluids over the cover or the LCD screen.
- Do not push objects into ventilation openings of the display unit.

2.3.7 Hazardous materials

WARNING:

The LCD panel is composed of multiple layers of glass and protective glass with a small amount of liquid in between. Rough handling or dropping can cause the LCD panel to break. If any part of the skin or body comes in direct contact with the liquid, immediately wash the affected areas with plenty of water for at least 15 minutes. If any symptoms are present after washing, get medical care.

2.3.8 Disposal information

WARNING:

The fluorescent tubes inside the backlight of the LCD contain a small amount of mercury that is considered hazardous to a person's health. Please follow local regulation or laws for disposal.

2.4 Package & storage

2.4.1 General

A safe transport of the units can only be guaranteed if the original undamaged package is used for shipping. Handle with care when transporting.

Keep your original packaging. It is designed for this unit and is the ideal protection during transportation.

2.4.2 Procedure in case of damages

All shipments should be opened and inspected for concealed damage or pilferage as soon as possible after the arrival at destination. The shipping cartons should be retained for the surveyor's inspection and full and accurate reserves must be made by a letter or a fax message.

Depending upon the used means of transport, the written protest is subject to different time-rules:

- by sea: the protest has to be issued against the captain and/or ship within 3 days of the delivery of the goods.
- by road: the protest has to be issued against the last road-carrier within 7 days after delivery of the goods.
- by air: the protest has to be issued against the air-carrier within 14 days after delivery of the goods.

In all cases, a claim or potential claim should be reported as soon as possible whether or not full documentation is immediately available.

After completion of all required steps, the claim should normally be finalized within one month. For more information about the claims handling procedure, contact Barco n.v.

2.4.3 Storage

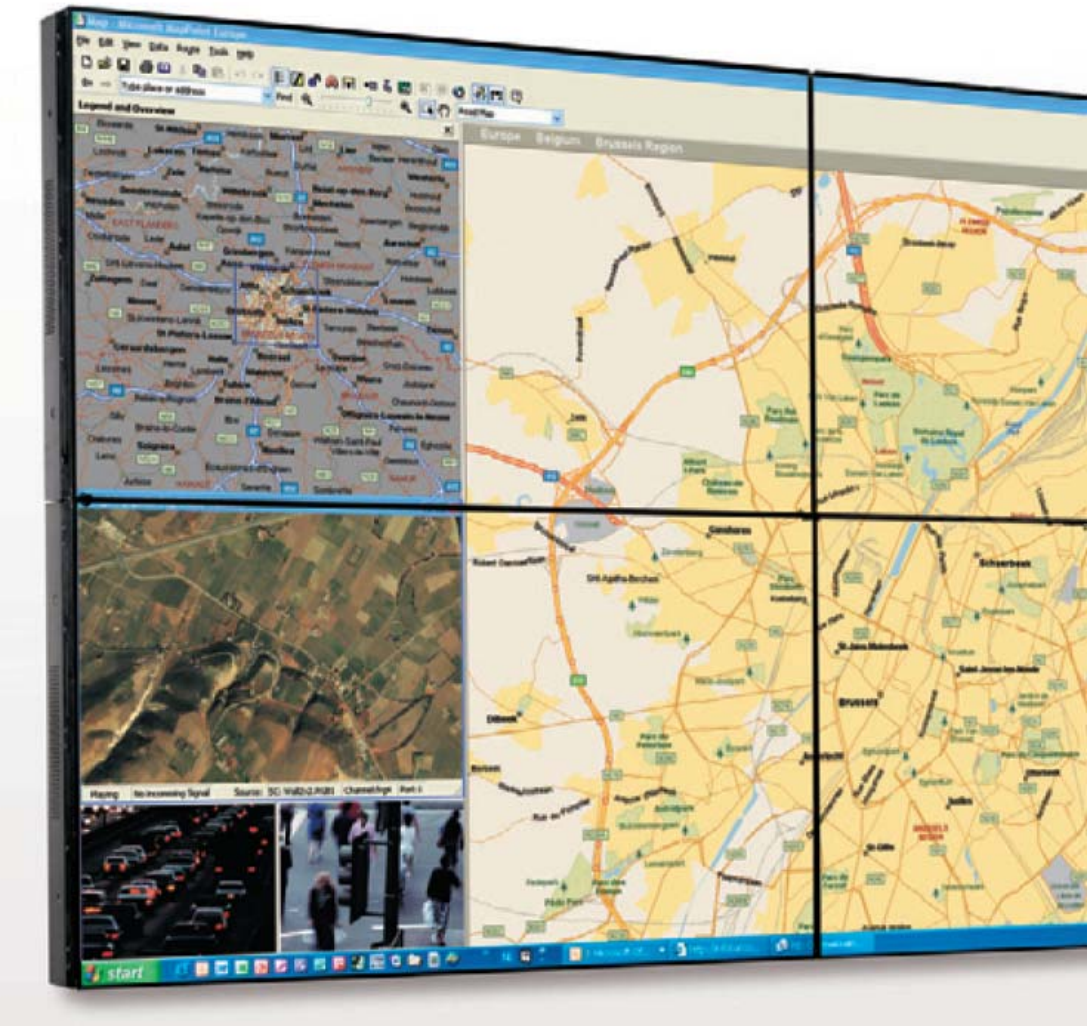
It is best to store the display unit in its original packaging in a room that does not exceed the storage conditions mentioned in the technical specification.

2.4.4 Electrolytic capacitors

The display unit needs to be powered on for a period of 24 hours at least once every 2 years to allow internal electrolytic capacitors to be reformed. Failure to do so may lead to compromised reliability.

3 About the product

3.1 NSL-4601



The NSL-4601 is a professional grade, narrow-bezel 46" LCD display with WXGA resolution. The unit has been designed for tiled video wall applications in small to medium-sized control rooms. As a tiled LCD solution the NSL-4601 is ideal for Emergency Operations Centers, traffic and surveillance centers, and utilities and process control rooms. The NSL-4601 is combining a space-saving design with the best image quality around in terms of resolution and viewing angle.

The Key features are:

Multiple sources, native resolution

In combination with a Barco display controller, the NSL-4601 allows to present sources in native resolution without loss of content, or scaled. Multiple sources (video, PC content or streaming video) can be presented and positioned anywhere across the entire LCD wall.

Stable colors (Optional DCMS software)

The unit can be calibrated by means of Barco's display consistency management software (DCMS). This ensures a correct white point and accurate grayscales.

Space saving

NSL-4601 video walls can be serviced from the front and the back. They require no back room space at all, so they are ideally suited for control rooms where space is limited. The high resolution of the tiled NSL-4601 video wall allows operators to sit close by and monitor high-density information.

Front access

The unit has a smart, tiltable wall structure, which allows to easily service the display wall's electronics and cabling from the front. They require no back room space at all.

Barco Wall Control Manager (BCM):

Barco's NSL-4601 comes with Barco Wall Control Manager for video walls, a software package that continuously supports worry-free operation of your video wall. No more surprises, no unplanned or distracting maintenance interventions.

Wall configuration

The Wall Control Manager supports operators in setting up the wall configuration. It also allows to choose the desired input, for individual modules, the entire wall or for a group of modules.

Device monitoring

The Wall Control Manager will monitor and present the actual status of all devices. For each module, health related information is presented on a status indicator.

Control room management software (CMS):

Today's control rooms are complex networked environments handling an ever increasing number of video and data sources. Efficient collaboration and decisionmaking is only possible if there is easy and timely access to this information.

In combination with Barco's control room management software (CMS), the NSL-4601 video wall can significantly facilitate the decision-making and collaboration process.

Barco's control room management suite provides operators and decision-makers with easy access to information and allows them to connect to information, to configure how it is displayed, and to collaborate in the most efficient way.

- Barco's CMS software allows the operator to generate a preview of a multitude of sources (e.g. video, application screen data, external DVI feeds, etc.) on his personal workstation.

- Once a personalized view has been created, the operator can send (push) it to any video wall with pre-approved access.
- CMS is also able to bring up (pull) sources that are displayed at remote display walls onto the local operator's screen.

Easy video and data integration

The NSL-4601 display is also compatible with Barco’s full range of display controllers, including the PWS-101 workstation for multi-monitor personal desktops and small to medium-sized video walls, Barco's TransForm series of ultra-fast video wall display controllers and Barco's multiviewers which enable operators to monitor their broadcast processes and visualize video content in real-time from anywhere in the facility.

4 Installation

4.1 Installation precautions

- Keep the original packaging. It is designed for this unit and is the ideal protection during transport.
- Allow adequate ventilation in case the configuration is built in a rack or a console, so that the heat can properly dissipate.
- For units where the power cable or connector is the primary means of detaching the system from the power supply. One of the cable ends (or power connector) should be easily accessible.
- Make sure all units are disconnected from mains before connecting the signals.
- The display unit must be earthed correctly, as described in the safety precautions paragraph.
- Before connecting the unit to mains, check if the power source voltage corresponds to the mains voltage marked on the identification label on the display.

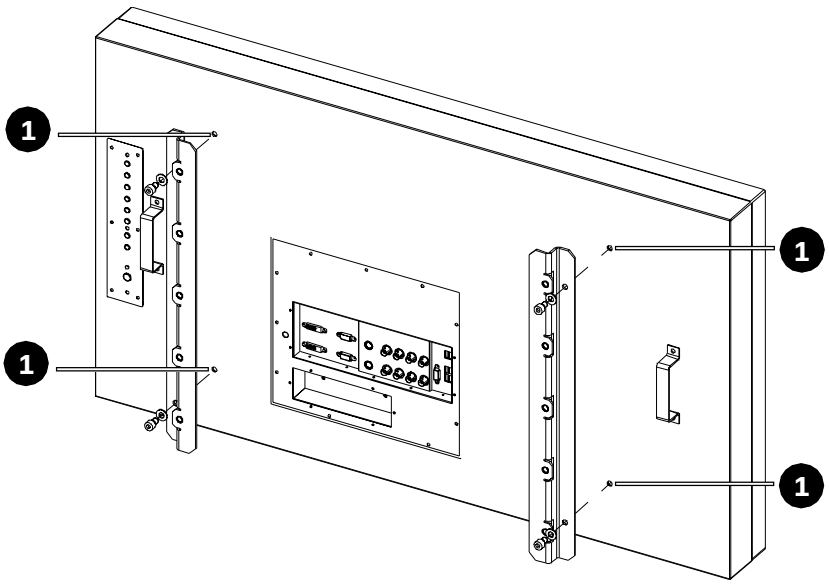
4.2 Specific installation precautions

- The panel is foreseen with 2 handles at the rear side of the panel for easy transportation. During installation or transportation, 2 people should lift an edge of it by holding the handle.
- Do not grip the front of the panel, the panel may get damaged when to much pressure is applied. The display is slim and fragile, handle it carefully.
- Do not incline the panel forward, the edge or bottom of the panel could be damaged.
- In case the panels need to be tiled on a wall, make sure the edges do not collide with eachother during the installation, the edges could be damaged.

4.3 Mounting procedure

4.3.1 VESA compliant mounting solution

The NSL-4601 can be mounted on a device that is compliant to the VESA MIS-F 600x200mm or 600x400mm standard with M8x12 screws.



1	VESA MIS-F solution mounting holes M8 (4x)

Figure 1: VESA MIS-F compliant mounting

To attach the display to a device:

Attach the display firmly to the VESA comliant device using 4 screws M8x 12mm

IMPORTANT:

Use a device that is approved by VESA (according to the VESA MIL-F standard 600x200 or 600x400)

Use an arm that can support a weight of at least 30 kg or 66 lbs.

4.3.2 Tiltable wall structure

The units can be installed on a tiltable wall structure. Refer to the installation manual for more detailed information.

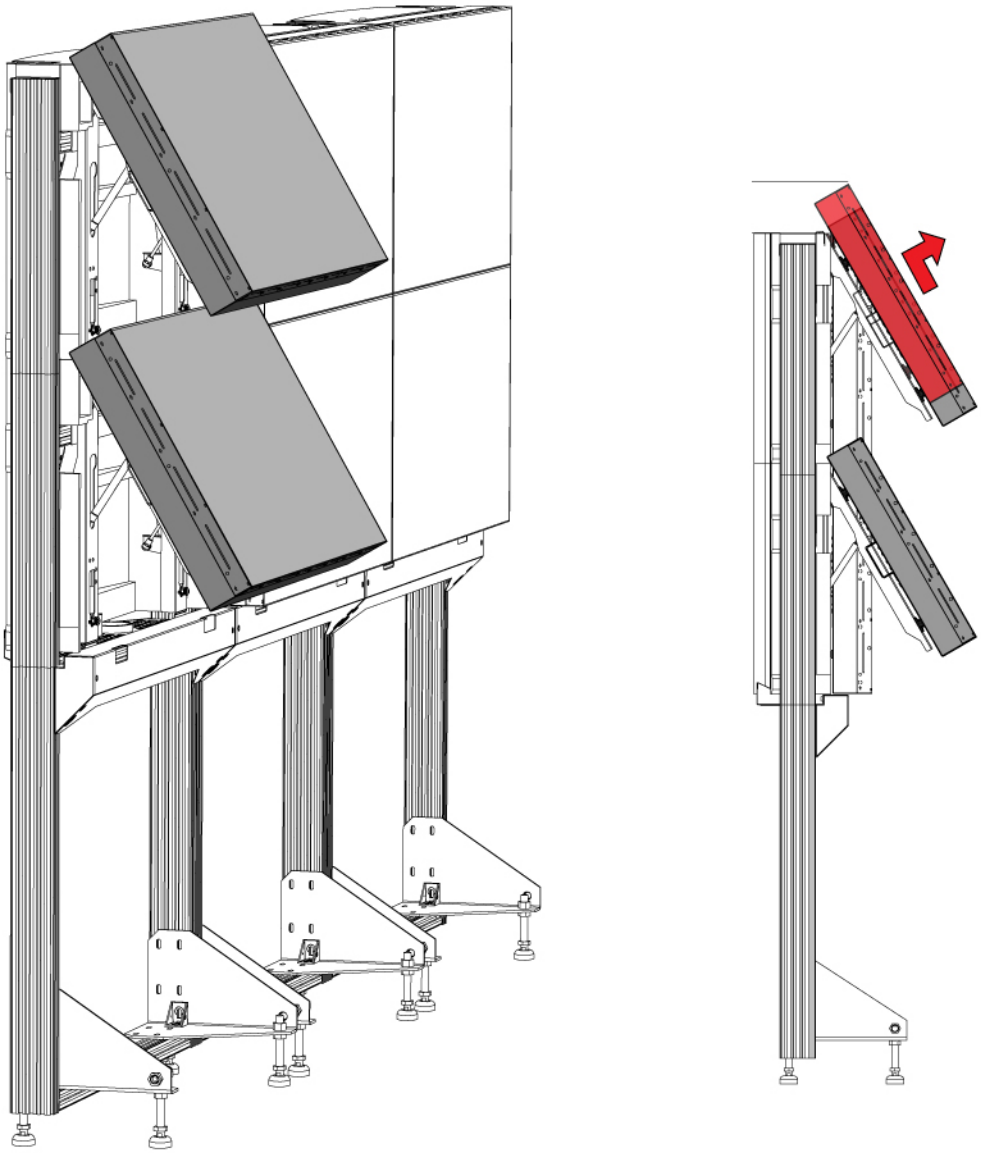
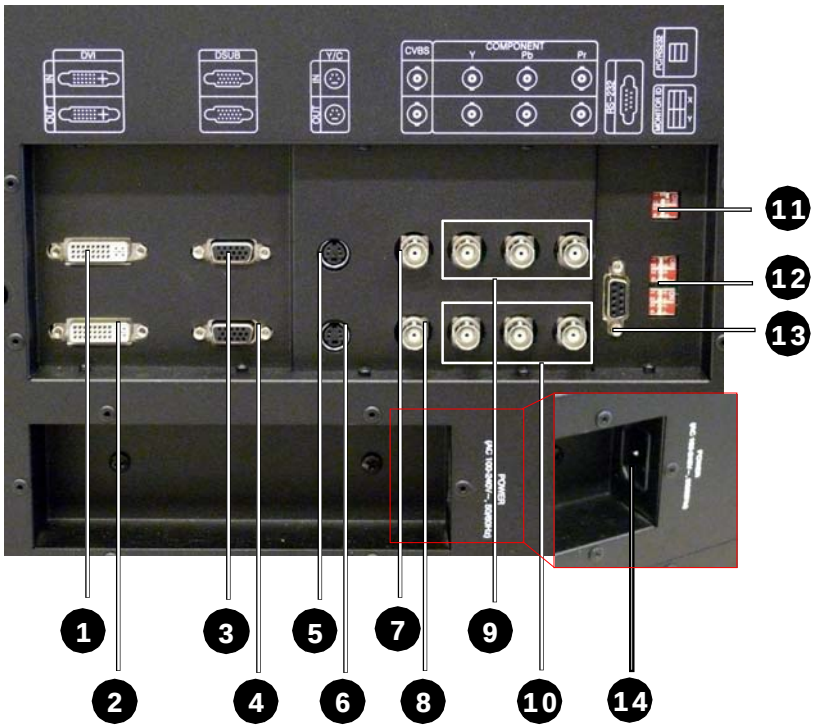


Figure 2: Tiltable wall structure

4.4 Connecting the signals

4.4.1 Location of the connectors

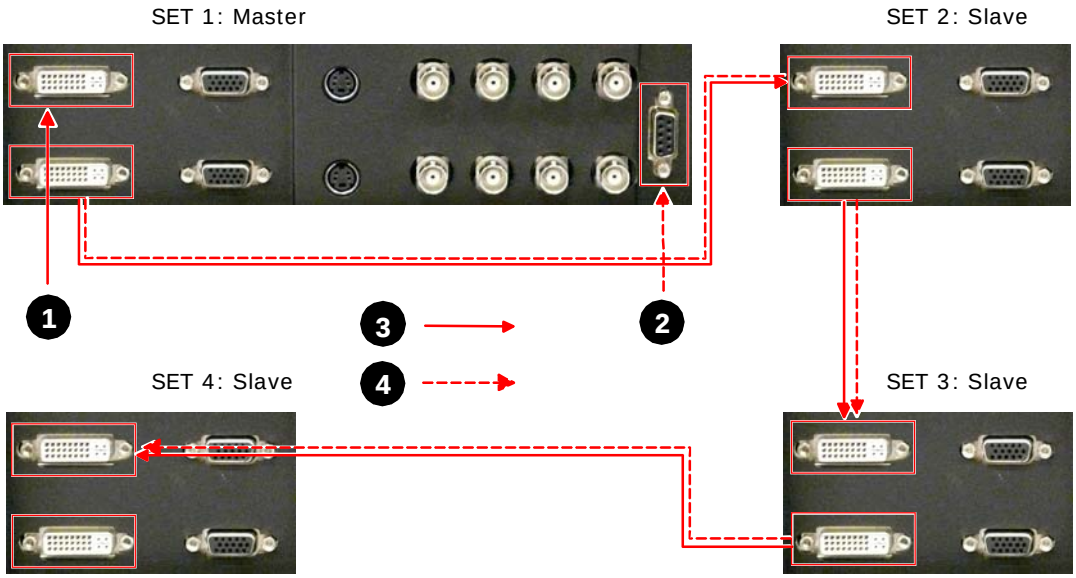


1	Digital Video Signal Input (DVI-D) connector
2	Digital Video Signal Output (DVI-D) connector
3	Analog Signal Input (SubD) connector
4	Analog Signal Output (SubD) connector
5	Super Video Signal Input connector (optional)
6	Super Video Signal Output connector (optional)
7	Composite Video Signal (CVBS) Input connector (optional)
8	Composite Video Signal (CVBS) Output connector (optional)
9	Component Video Signal (Y, Pb, Pr) Input connectors (optional)
10	Component Video Signal (CVBS) Output connectors (optional)
11	RS232 / I2C DIP switch
12	Monitor ID DIP switch
13	RS-232 In (SubD) connector
14	Power connector

Figure 3: Connector location NSL-4601

4.4.2 Connections for DVI and RS-232 with real DVI loopthrough

In this case, the master display or SET1 must be configured as master, the other displays (SET2, 3 and 4) are to be configured as slave. The RS-232 data transmission to the slave units is done by using the I²C EDID lines in the DVI cable. See also the RS-232 DIP switch setting paragraph for the master/slave configuration of the display.

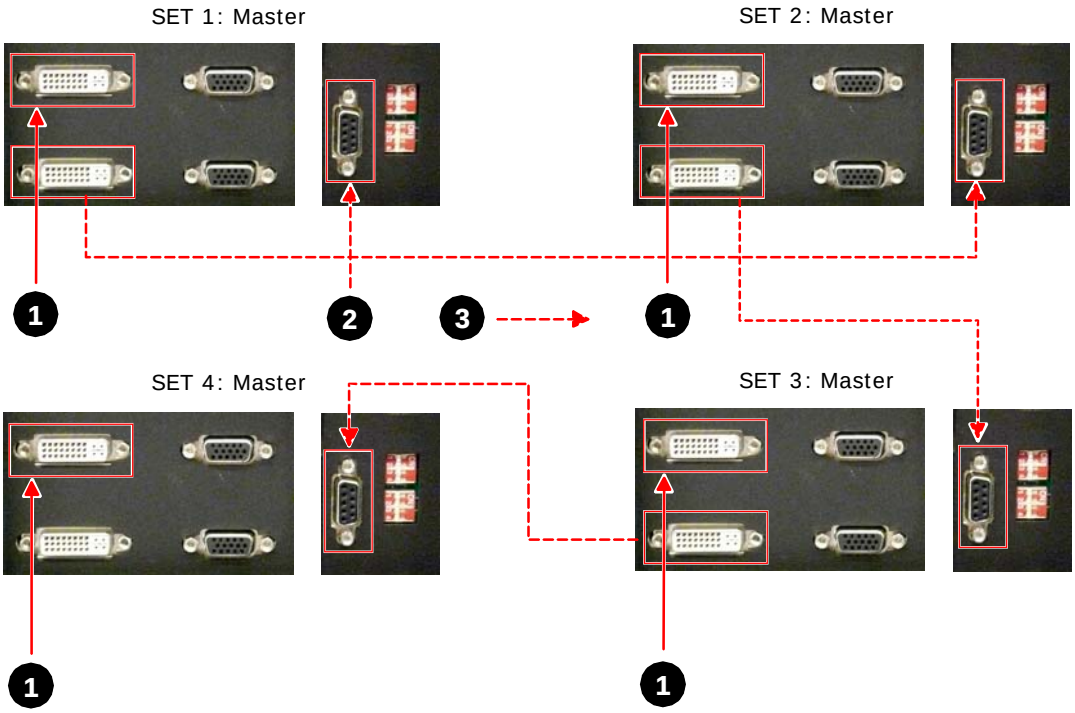


1	Digital Video Input signal (DVI source needs to be connected with set 1)
2	RS-232 In via RS cable (RS-232 cable needs to be connected with set 1)
3	DVI connections (DVI needs to be connected between each sets)
4	RS-232 data transmission (RS-232 data flows through DVI cable)

Figure 4: DVI and RS-232 connection with real DVI loopthrough (e.g. control room with 4 units)

4.4.3 Connections for DVI and RS-232 with DVI to RS-232 loopthrough

In this case, all displays (SET1, 2, 3 and 4) must be configured as master. The DVI source is connected to each display. The RS-232 needs to be connected to the first display (SET1), the other displays (SET 2, 3 and 4) are connected together for RS-232 data tranmission by using the DVI to RS-232 cable. See also the RS-232 DIP switch setting paragraph for the master/slave configuration of the display.



1	Digital Video Input signal (DVI source needs to be connected with all sets)
2	RS-232 In via RS cable (RS-232 cable needs to be connected with set 1)
3	RS-232 data transmission is done via DVI to RS-232 cable (DVI-out needs to be connected to RS-232 In of the next set)

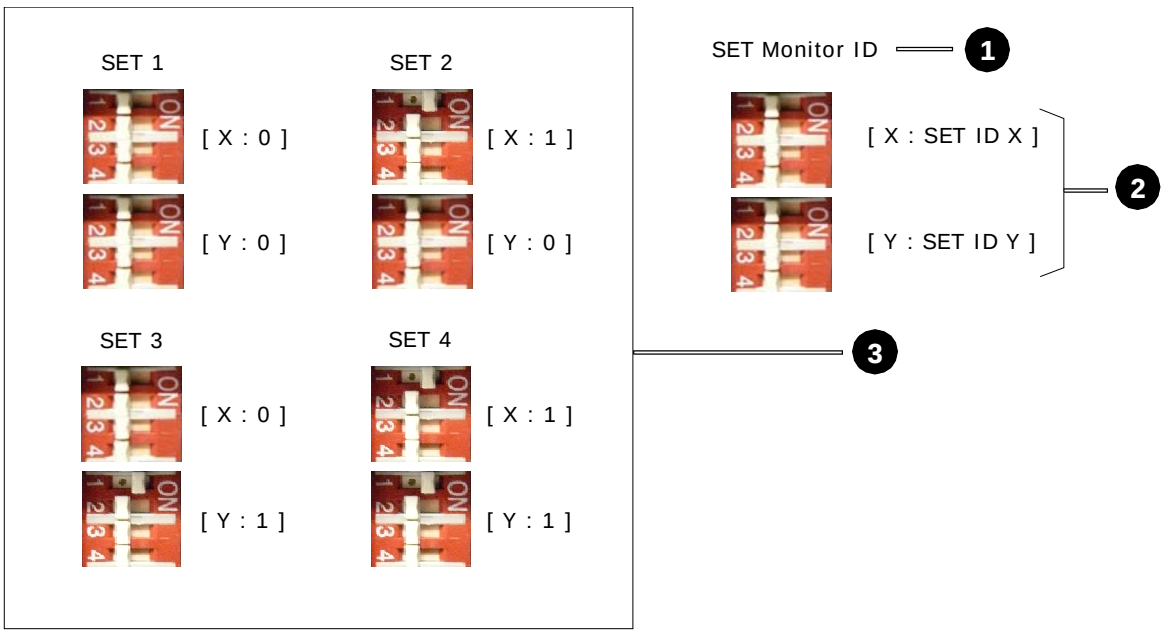
Figure 5: DVI and RS-232 connection with DVI to RS-232 (e.g. Digital Signage with 4 units)

4.4.4 Monitor ID DIP switch settings

The address of a monitor (monitor ID) is a double (x, y) where x represents the horizontal position (column) and y the vertical position (row) of the monitor in the wall. The top left monitor (seen from front) has the address (0,0): Numbering starts with zero and goes from left to right and from top to bottom.

The address is set in binary code via two 4-dip switches, one for x and one for y. These dip switches are at the rear side of the monitor, see schematics of interfaces.

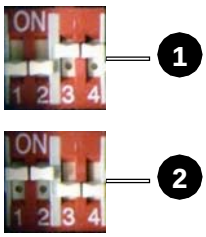
Below an example of 4 sets is given:



1	Monitor ID: the DIP switch is used to set the monitor ID via its X/Y coordinates
2	The X, Y coordinates need to be set to binary code
3	This is an example of the monitor ID setting for a set of 4 monitors

Figure 6: Monitor ID DIP switch settings

4.4.5 RS-232 DIP switch setting (Master/Slave)



1	switch setting for the set which receives the signal directly from the source, not related with another monitor ID (Master)
2	switch setting for sets where the RS communication is done via the DVI loopthrough (Slave)

Figure 7: RS-232 DIP switch setting

5 Operation

5.1 Operating precautions

- Avoid displaying fixed patterns on the display for long periods of time to avoid image persistence (after-image effects).
- For optimum performance, allow 20 minutes for warm-up.
- The unit should be used in environmental conditions as described in the technical specification. Using the display beyond its specifications (temperature, humidity,…) will degrade its performance.

5.2 Image persistense notice

Image persistence is when a residual or “ghost” image of a previous image remains visible on the screen.

Unlike CRT monitors, LCD monitors image persistence is not permanent, but constant images being displayed for a long period of time should be avoided. To alleviate image persistence, turn off the monitor for as long as the previous image was displayed. For example, if an image was on the monitor for one hour and a residual image remains, the monitor should be turned off for one hour to erase the image.

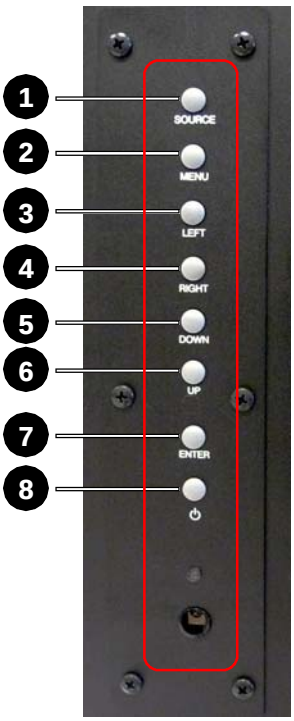
NOTE:

As with all personal display devices, it is recommended to use a moving screen saver at regular intervals whenever the screen is idle or to turn off the monitor when not in use.

5.3 Function of primary controls and indicators

5.3.1 Primary controls

5.3.1.1 Location of primary controls



1	SOURCE: Selects the external input source
2	MENU: Activates the OSD menu, returns to the previous menu
3	LEFT: Function control in OSD
4	RIGHT: Function control in OSD
5	DOWN: Function control in OSD
6	UP: Function control in OSD
7	ENTER: confirms your choice
8	STANDBY: Power On / Off button

Figure 8: Primary controls of the NSL-4601

5.3.2 Indicator LED

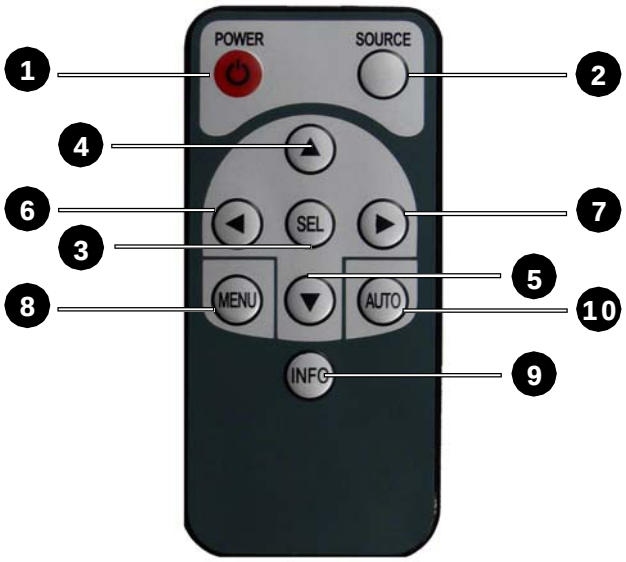
A power (Standby) LED is provided at the rear of the screen.

- Green : normal operation
- Red : standby mode

1	Power (Standby) LED

Figure 9: Indicator location on the NSL-4601

5.3.3 Remote control



1	Power: Power On / Off button
2	Source: Selects the external input source
3	Select: confirms your choice
4	Up: Function control in OSD
5	Down: Function control in OSD
6	Left: Function control in OSD
7	Right: Function control in OSD
8	Menu: Activates the OSD menu, returns to the previous menu
9	Info: Information Display
10	Auto: Automatically adjust position & horizontal size, phase (PC mode only)

Figure 10: Location of the primary controls on the remote control

NOTE:

The remote control receiver is located below the power LED on the control panel at the rear side of the display. Access via the remote control should be done from the rear side of the panel.

NOTE:

Battery replacement should be done as depicted on the back side of the remote control. Use a Lithium Battery CR2025 3V type.

CAUTION:
Replace with the correct battery type, there is risk of explosion if the battery is replaced with an incorrect type.

5.4 Adjusting display settings

5.4.1 Using the on screen display

5.4.1.1 Controls

Following controls are available on the monitor. There are 8 buttons:

Main function	Menu
Power	Power On / Off Button
Source	This button is used to active and deactivate source select OSD
Menu	This button has two functions: • Active and deactivate OSD • Return to previous menu
Select	When the OSD menu is popped up, if this button is pushed The current menu will be selected
Up/Down	This button is used to navigate OSD menu When the OSD main menu or sub-menu is popped up, if this button is pushed, the active menu will move to upper/lower menu
Left/Right	This button is used to decrease the value of OSD menu. After choosing the OSD menu and this button is pushed the value of OSD will be decreased/increased.

5.4.2 OSD overview functions

Main Menu	Sub Menu	Adjust parameter	
Picture	Picture Mode	PC/DVI input: User, High, Middle, Low Component/S-Video/CVBS input: User, Dynamic, Standard, Movie, Mild	
	User	Contrast, Brightness, Sharpness (S-Video/AV/Component), Color(S-Video/AV/Component), Tint(S-Video/AV)	
	Color Tone	User(Red, Green, Blue), Cool1(9300K), Cool2(10000K), Normal(6500K), Warm1(6200K), Warm2(5500K)	
	Size	PC/DVI input: Wide(16:9), 4:3 Component/S-Video/CVBS input: Wide(16:9), 4:3, Zoom, Panorama, Zoom, 14:9	
	PC	Auto Adjust	H/V Position, Clock, Clock phase
		Phase	Adjust the PC Phase
		H-Position	Adjust the PC input H-Position
		V-Position	Adjust the PC input V-Position
		Frequency	Adjust the PC input Frequency
Setup	Reset	Resets all user settings to default again	
	Time	Clock	Adjust present time setting
		On Timer	Turn on time setting
		Off Timer	Turn off time setting
	Language	English, Spanish, German, French	
	OSD Tone	Turn on/off OSD background blending	
	Key Lock	Turn on/off Key Lock function (Power key is not locked)	
Multi	Multi Function	H Cell Max	Adjust Horizontal Max Cell
		V Cell Max	Adjust Vertical Max Cell
		Cell Number	Adjust display number
		H Gap Adjust	Adjust Horizontal Gap
		V Gap Adjust	Adjust Vertical Gap
		SET ID X	Display Set ID X (Read Only)
		SET ID Y	Display Set ID Y (Read Only)

5.4.3 Selecting the Input Source

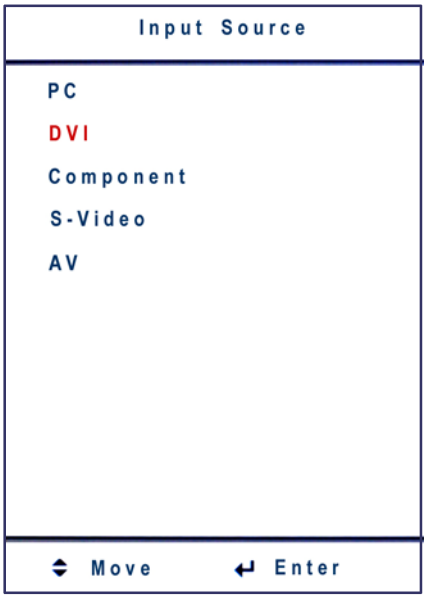


Figure 11: Input Source Menu

- Press the SOURCE button
- Navigate to the desired input source by using the UP/DOWN buttons
  - ✓ Following modes are available: PC – DVI – Component - S-Video - AV
- Press the ENTER (SEL) button

5.4.4 Selecting your Setup

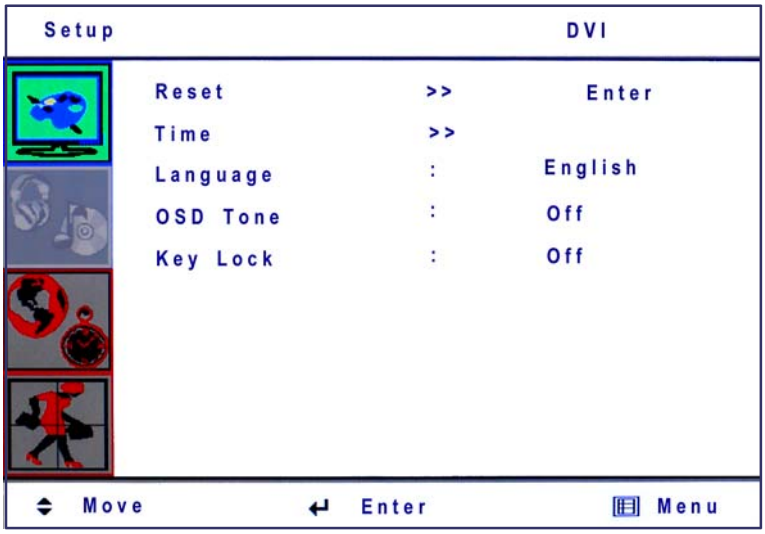


Figure 12: Setup Menu

- Press the MENU button
- Press the UP/DOWN buttons to navigate to the Setup group and then presss the SELECT button
  - ✓ The Setup Menu is selected
- Select the Reset parameter by using the LEFT or ENTER (SEL) button. This resets all user settings again to the default values.
- Beside the Reset function, following other settings can be done via the Setup menu: Time – Language – OSD Tone – Key Lock

Time	See Changing the Time value
Language	Different OSD languages can be chosen here
OSD Tone	Puts the OSD Tone On or Off
Key Lock	Via this parameter, the OSD keys (Menu key, Source key, Select key, Up and Down key, Left and Right key) can be Locked or Unlocked The power key and the IR control are not locked in Key Lock On status

5.4.5 Changing the Time Value

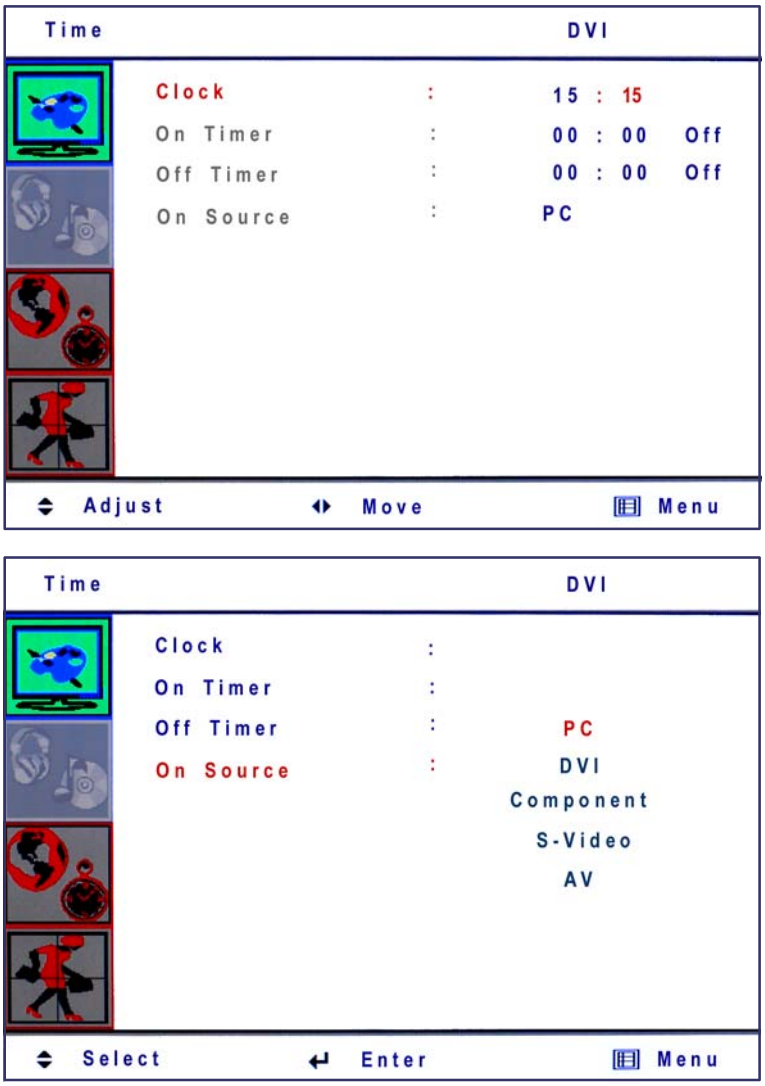


Figure 13: Time Menu

- Press the MENU button
- Press the UP/DOWN buttons to select the Time group. Press the ENTER (SEL) or UP button.
- Select the Real Time mode by using the ENTER (SEL) or RIGHT button

✓ Following parameters can be adjusted: Clock – On Timer (on/off) – Off Timer (off/on) – On Source (PC, DVI, Component, S-Video, AV)

Clock	Here the current time can be set (hh : mm)
On Timer	Here one can enter the 'wake up' time for the display (display will be automatically powered up from its Standby mode at the predefined On time). Therefore the On Timer needs to be set in On mode.
Off Timer	Here one can enter the 'off' time for the display (display will be automatically put in Standby mode at the predefined Off time) Therefore the Off Timer needs to be set in On mode.
On Source	This parameter allows you to enter the source that needs to be displayed at On time

5.4.6 Changing the Picture setting

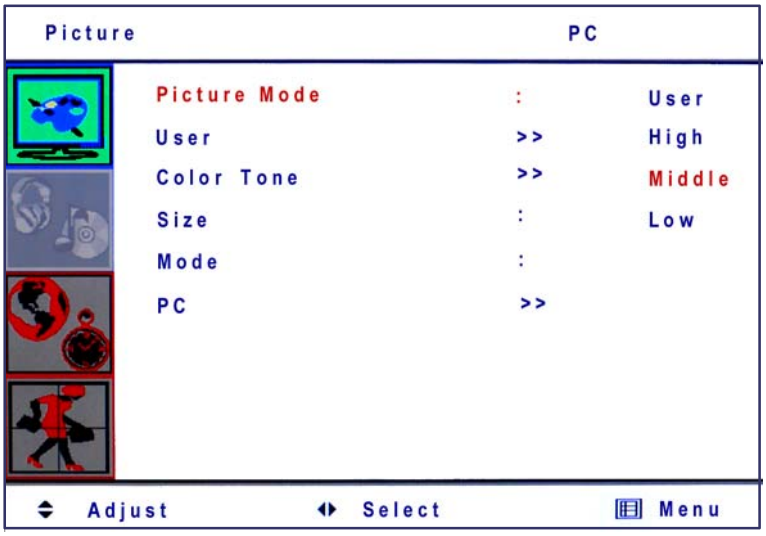


Figure 14: Picture Menu

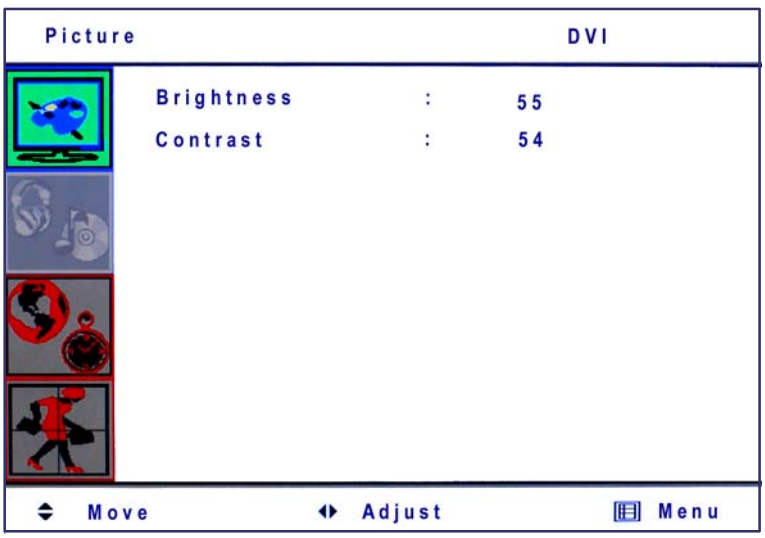


Figure 15: Picture Menu (User Mode)

- Press the MENU button
- Press the UP/DOWN buttons to navigate to the Picture group, press the ENTER (SEL) button.
- Use the UP/DOWN buttons to navigate to the Picture Mode parameter
- Select the Picture Mode parameter by pressing the ENTER (SEL) or the RIGHT button

✓ Following modes are available for PC/DVI inputs:
User – High – Middle – Low

User	User can adjust Brightness and Contrast
High	Brightness and Contrast value is a rather high
Middle	Brightness and Contrast value is Normal
Low	Brightness and Contrast value is a rather low

✓ Following modes are available for Component/S-Video/CVBS inputs:
User – Dynamic – Standard – Movie – Mild

User	User can adjust Brightness, Contrast, Color(Saturation), Tint(Hue), Sharpness
Dynamic	Brightness, Contrast and Sharpness value is a little high => Use this for dynamic picture viewing situations such as moving picture as sports
Standard	Brightness and Contrast value is Normal
Movie	Brightness and Contrast value is a rather low => Use this for movie
Mild	Brightness and Contrast value is a rather low => Use this for smooth picture viewing situations

- Press the Menu button to return to the previous menu

5.4.7 Changing the Picture Size

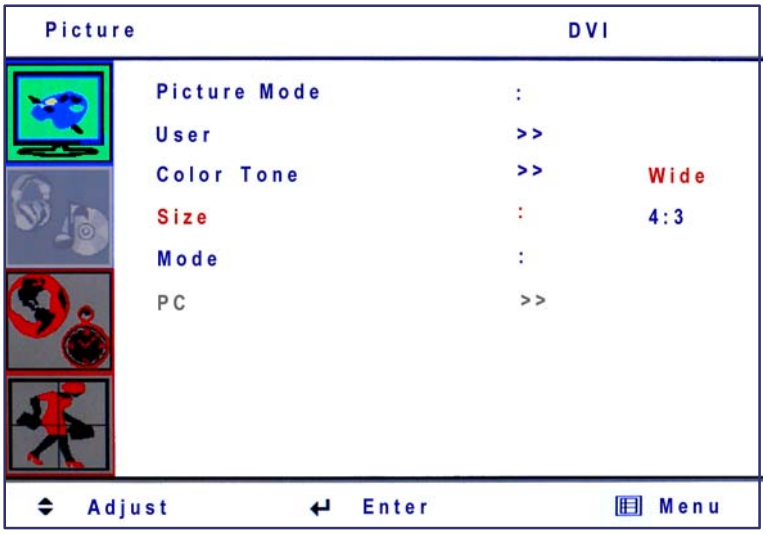


Figure 16: Picture Menu

- Press the MENU button
- Press the UP/DOWN buttons to navigate to the Picture group, press the ENTER (SEL) button
- Press the UP/DOWN buttons to select the Size parameter
  - ✓ Following modes are available for PC/DVI inputs: Wide – 4:3
  - ✓ Following modes are available for Component/S-Video/CVBS inputs: Wide – 4:3 – Panorama – Zoom –14:9
- Navigate to the desired mode by using the UP/DOWN buttons, press ENTER (SEL) or the RIGHT button to activate
- Press the UP/DOWN buttons to select the NR (Noise Rate) parameter, pressing the ENTER (SEL) or RIGHT button activates (on/off select)
- Press the UP/DOWN buttons to select the Film Mode parameter, pressing the ENTER (SEL) or RIGHT button activates (on/off select)
- When finished the picture settings, press the MENU button to return to the previous menu.

5.4.8 Changing the Color Tone

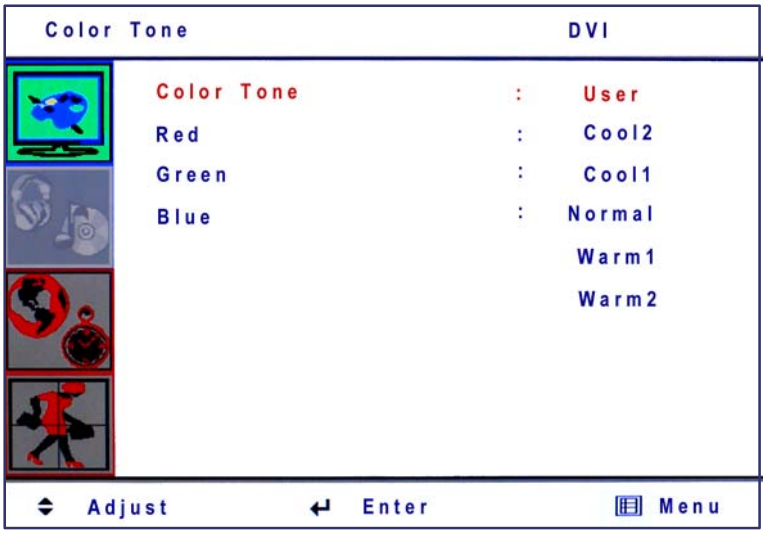


Figure 17: Color Tone Menu

- Press the MENU button
- Navigate to the Color Tone group by using the UP/DOWN buttons, press the ENTER (SEL) or RIGHT button
- Press the ENTER (SEL) or RIGHT button to select the Color Tone parameter
  - ✓ Following Color Tones can be set: User – Cool2 – Cool1 – Normal – Warm1 – Warm2

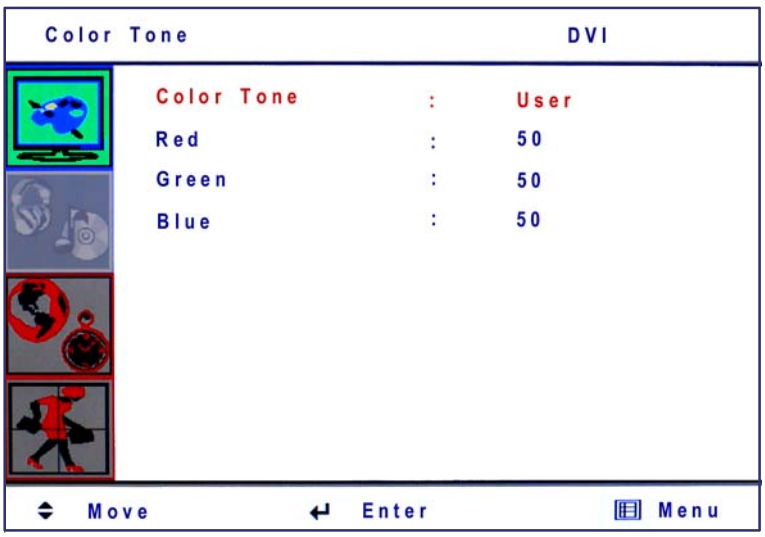


Figure 18: Color Tone Menu (User)

- Select the User by pressing the ENTER (SEL) or RIGHT button
  - ✓ The Color Tones are displayed in the following order: Red: 50 / Green: 50 / Blue: 50 (default)

- When Color Tone settings are finished, press the MENU button to return to the previous menu.

5.4.9 Changing the Multi Function

The multi menu settings menu settings are usefull for applications, displaying on source as scaled image on a display wall.

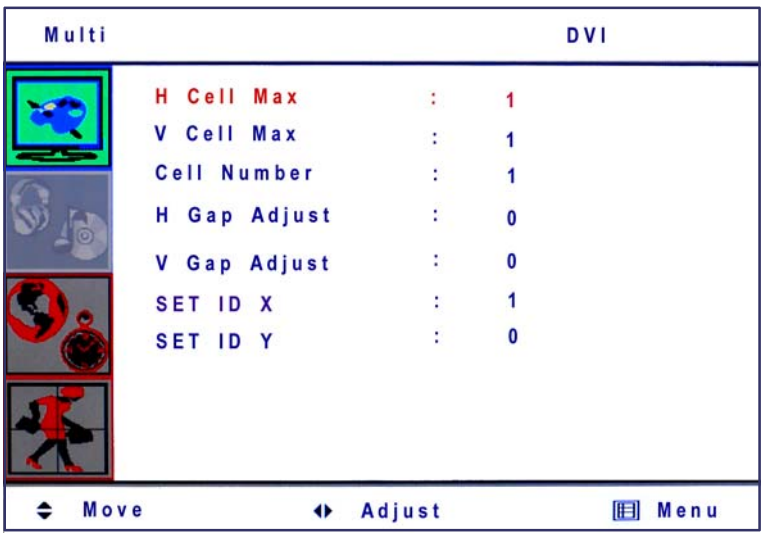


Figure 19: Multi Menu

- Press the MENU button
- Press the UP/DOWN buttons to navigate to Multi group, press the ENTER (SEL) or RIGHT button
- Press the ENTER (SEL) or RIGHT button to select Multi Function
  Following settings can be done:
  - ✓ H Cell Max, V Cell Max, Cell Number, H Gap Adjust, V Gap Adjust range: 1 to 20), SET ID X, SET ID Y

H Cell Max	Enter the number of displays in a row (range: 0 to 15).
V Cell Max	Enter the number of displays in a column (range: 0 to 15).
Cell Number	Enter the cell number. This is the location of the display in the wall (starting from the top left monitor 0 and then from left to right and top to bottom). (range: 0 to 255)
H Gap Adjust	The seam between adjacent monitors result in a small gap between the sections of the image. The horizontal gap can be adjusted via this parameter (range: 0 to 20). See illustration below.
V Gap Adjust	The vertical gap can be adjusted via this parameter (range: 0 to 20). See illustration below.
SET ID X	Displays the X ID (set ID for RS-232 control) or horizontal position of the monitor in the wall (range: 0 to 15).
SET ID Y	Displays the Y ID (set ID for RS-232 control) or vertical position of the monitor in the wall (range: 0 to 15).

- Press UP or DOWN button to change the settings

- When settings are done, press the MENU button to return to the previous menu.

Below an illustration of a geometric pattern with (natural mode) and without cell gap correction (full mode) is given. The small gaps can be removed by the so-called cell gap correction (image shift). The eye then perfoms a kind of interpolation and realizes a smooth image:

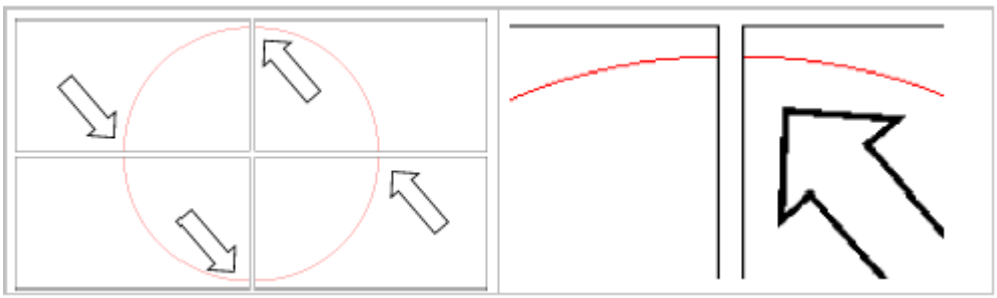


Figure 20: Pattern without cell gap correction (full mode)

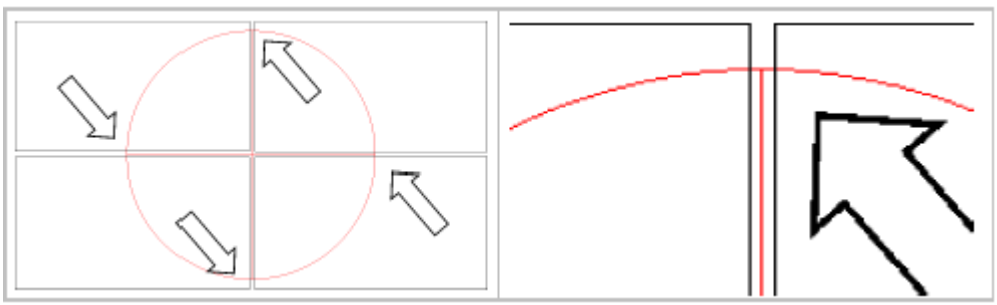


Figure 21: Pattern with cell gap correction (natural mode)

NOTE:

It depends on the displayed image if cell gap correction should be enabled or not: In case text is displayed, cell gap correction results in missing (parts of) letters. For geometric patterns (see picture above) cell gap correction results in a smooth picture.

6 Maintenance

6.1 Cleaning precautions

- Take care not to damage or scratch the LCD surface. Be carefull with rings, jewellery and rough materials. Handle the LCD with care to avoid scratches.
- Do not apply pressure on the LCD surface.
- Do not apply or spray liquid directly to the LCD surface or cover as excess liquid may cause damage to internal electronics. Instead apply the liquid to the cleaning cloth.
- Avoid dirt of fingerprints, oil, and fat staining on the LCD surface as they will harm the LCD. Remove dirt by following the cleaning instructions below.

6.2 Cleaning instructions

Before cleaning:

- Switch off the display unit.
- Remove the power cord from the mains.

Cleaning the LCD screen:

- Wipe the screen surface with a soft cleaning cloth.
- To remove stains, use a damp cloth with non-aggressive cleaning products:
  - ✓ Do NOT use abrasive cleaning agents, glass cleaner or tissue paper.
  - ✓ Do NOT use alcohol/solvents at higher concentration > 5%.
  - ✓ Use non-aggressive cleaning products (water or a solution of distilled water and IsoPropyl Alcohol).
- Do not rub or push on the LCD screen. Rubbing with tissue can degrade the performance of the LCD screen.

Cleaning the cover:

- Use a soft cloth to remove dust. If necessary, a vacuum cleaner can be used to clean the ventilation openings.
- Use a damp cloth (if necessary with some mild detergent) to remove stains.
- Do not use a scouring pad, or other tools that my scratch and damage the cover.
- Do not use strong detergents such as alcohol and thinner.

7 Troubleshooting

No picture

- Check whether the monitor is in standby mode. You can bring your monitor out of standby by pressing the standby button.
- Check if the power cord is inserted into wall power outlet.
- Test the wall power outlet, plug another the power cord of another device into the outlet where the monitor power cord was plugged in.
- Check the picture contrast and brightness settings.
- The signal cables should be completely connected to the unit.
- Check all connectors for bent or pushed in pins.
- Check that a valid input signal is applied.

Picture appears slowly after switching on

- This is normal, the image is muted during the product startup process. Please contact Barco, if the picture has not appeared after five minutes.

The signal is out of range

- Adjust resolution.
- Check it whether the signal cable is connected or loose.
- Check the input source.

Screen color is unstable or single color

- Check the signal cable.
- Reinstall the PC video card.

8 Specifications

8.1 Electro-optical specifications

8.1.1 Panel

- Active Matrix LCD (AM-LCD) – 8 bit/color
- Super Pattern Vertical Alignment (SPVA) mode type, normally black
- Incorporating amorphous silicon TFT.

8.1.2 Image specifications

8.1.2.1 Screen dimensions

- Aspect ratio 16:9
- Screen dimensions :
  - ✓ 1019 x 573.1 mm (40.1” x 22.6”)
  - ✓ 1,168.4 mm (46”) diagonal

8.1.2.2 Screen specifications

- 16 777 216 colors – 256 gray scales
- Typical viewing angle:
  - ✓ Horizontal: ± 178°, Vertical: ± 178° @ CR >= 30

8.1.2.3 Viewing angle

- Horizontal: 178°
- Vertical: 178°

8.1.2.4 Haze

- 40%

8.1.2.5 Surface hardness

- Hard-coating (3H)

8.1.2.6 Light output

- Maximum light output: 700 cd/m2
- Typical light output: 500 cd/m2

8.1.2.7 Contrast ratio

- Contrast Ratio in dark environment
  - ✓ 3000:1 (typ)
  - ✓ 2500:1 (min)

8.1.2.8 Resolution

- WXGA resolution: 1366 x 768 pixels

- 1 pixel is composed of 3 sub pixels R, G and B (RGB Vertical Stripe configuration)
- pixel dimensions: 0.7455 mm x 0.7455 mm

8.1.2.9 Color temperature

- Typical 10.000K in the center and perpendicular to the screen
- Typical CIE coordinates are mentioned in the table below

	x	**y**
Red	0,643	0,328
Green	0,271	0,599
Blue	0,143	0,0060
White	0,280	0,290

8.1.2.10 Response time

- Rise time (black to white transition): 10 ms typ.
- Fall time (white to black transition): 6 ms typ.
- Gray to gray transition: 8 ms typ.

8.1.2.11 Luminance uniformity

- White non-uniformity <= 25%
  - ✓ Non-uniformity = 100%(Lmax – Lmin) / Lmax
  - ✓ Luminance measured at 9 points evenly distributed on display
  - ✓ Measurement conforms to “VESA Flat Panel Display Measurements Standard Version 2.0”.

8.1.2.12 Pixel defects

Dot defect: when luminance of dot is brighter or darker then surrounded dots

Dot Defect Type Dot Defect Type		**Max**
High Dot	Random	**5**
	Adjacent 2 dots	**3**
	Adjacent 3 dots	**1**
Low Dot	Random	**15**
Off Dot	Random	**10**
	Adjacent 2 dots	**5**
	Adjacent 3 dots	**3**
Total amount of Dots		**20**
Minimum Distance between defects	High dot High dot	**5mm**
	Off dot Off dot	**Ignore**

Dot Classification Method: the criteria of dot is defined by its brightness

Brightly visible dot comparing with background

STEP1: Start dot defect test at 0% Gray Pattern

- If visible Go to 25% Gray Pattern

STEP2: At 25% Gray Pattern

- If brightly visible
  - ✓ For Red/Blue, go to 50% Gray Pattern
  - ✓ For Green, go to 30% Gray Pattern
- If invisible
  - ✓ No count

STEP3:

At 50% Gray Pattern for Red/Blue

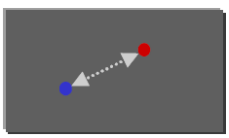
At 30% Gray Pattern for Green

- If brightly visible
  - ✓ High dot
- If Invisible
  - ✓ Low Dot

Darkly visible dot comparing with background

- Looks relatively dark at 100% Gray R, G ,B , White pattern.
  - ✓ Off dot

Minimum Distance between Dot Defects:



Minimum distance is direct distance (see picture)

Definition of Uniformity Defect:

While operating LCD panel, if certain area is remarkably brighter or darker. However, extraneous substances which can be wiped out, like finger print, particles, are not considered as a uniformity defect.

Spot and Linear Type Inspection:

Defect type	**Criteria**	**Max**
Spot Defect	0.1 < D <= **3** (mm)	**10**
Linear Defect	0.01 < W <= **0.7** (mm) Criteria	**15**
	2 < L <= 15.0 (mm) Criteria	
Total amount of Defects		**20**

Light Leakage:

There shall be no visible light around the edges of the screen.

Visual Appearance Defect Criteria:

Visible defect at non-operating LCD panel status.

Defect	**Criteria**	**Max**
Chassis Gap	Gap =< **1.5** (mm)	**-**
Spot Defect	0.1 < D <= **5.0** (mm)	**10**
Linear Defect	0.01 < W <= 0.7 (mm)	**15**
	2.0 < L <= 20.0 (mm)	
Total amount of Defects		**20**

8.1.3 Input signal specifications

8.1.3.1 Signal input

Input			Specification			Unit	Remark
			Min	Typ	Max		
PC(VGA) / DVI	Signal	RGB	0.714			Vp-p	
		DVI	T.M.D.S				
	Frequency	H	30.0	-	68.0	KHz	
		V	49	-	61	Hz	
	Separate (H,V) Sync (TTL)	High	2.0	-	5.0	V	
		Low	0	-	0.8		
	DVI (PC to MNT)		Max length : 10			m	
	DVI (Set1 to Set2)		Max length : 1.8			m	
Component (optional)	YPbPr	Y		1.0		Vp-p	
		Pb/Pr		0.7			
VIDEO (optional)	CVBS (Composite)	NTSC		0.714			
				0.286			Sync Signal
		PAL		0.7			
				0.3			Sync Signal
	S-VHS (Y/C)	NTSC		1.0			
				0.286			Sync Signal
		PAL		1.0			
				0.3			Sync Signal
CONTROL	RS-232C(PC to MNT)		Max length : 10			m	TBD

8.1.3.2 Supported resolutions

Resolution		**Hfreq(kHz)**	**Vfreq(Hz)**	**PixelClk (MHz)**
SVGA	800 x 600	37.879	60.317	40.000
XGA	1024 x 768	48.364	60.004	65.000
SXGA	1280 x 1024	63.981	60.020	108.00
WXGA	1360 x 768	47.700	60.000	84.700
	1366 x 768	47.700	60.000	85.030
	1366 x 768	47.700	50.000	84.238
	1368 x 768	47.700	60.000	85.896
	1368 x 768	47.700	50.000	84.330

8.1.3.3 Signal output

Output			Specification			Unit	Remark
			Min	Typ	Max		
PC(VGA) / DVI	Signal	RGB	0.714			Vp-p	
		DVI	T.M.D.S				
	Frequency	H	30.0	-	68.0	KHz	
		V	49	-	61	Hz	
	Separate (H,V) Sync (TTL)	High	2.0	-	5.0	V	
		Low	0	-	0.8		
Component (optional)	YPbPr	Y		1.0		Vp-p	
		Pb/Pr		0.7			
VIDEO (optional)	CVBS (Composite)	NTSC		0.714			
				0.286			Sync Signal
		PAL		0.7			
				0.3			Sync Signal
	S-VHS (Y/C)	NTSC		1.0			
				0.286			Sync Signal
		PAL		1.0			
				0.3			Sync Signal
CONTROL	RS-232C ('n' MNT to 'n+1' MNT)		Max sets : 16			sets	

8.1.4 Human Machine Interface (HMI)

8.1.4.1 On-Screen Display (OSD)

- The On-Screen Display (OSD) feature is the ability to display text on top of the input signal.
- This OSD information can be critical system information, on-line info, or errors / warnings.
- The OSD is accessible via the front control keys or the remote control.
- This information is remotely accessible via a host processor with RS-232 terminal.

8.1.5 Power supply specification

8.1.5.1 110/220 Vac (47-53Hz, 57-63Hz) supply

- Nominal voltage : 110 Vac or 220 Vac
- Operates between 90 Vac – 144 Vac or 180 Vac – 264 Vac
- Frequency range : 47 ~ 53 Hz or 57 ~ 63 Hz

8.1.5.2 Power consumption

- Pmax: 300 W
- Pmin: 5 W (Standby mode)

8.1.5.3 Safety

- CE : EN60950-1
- Worldwide: IEC 60950-1
- US: UL 60950-1
- Canada: c-UL CSA C22.2 No.60950-1
- China: CCC GB 4943-1995

8.1.6 Connectors

8.1.6.1 Input/Output connectors

- Digital Video Signal Input/Output: DVI-D In/Out connector
- Analog (R,G,B) Signal Input/Output: SubD 15p In/Out connector
- Super Video (Y/C) Signal Input/Output (optional): S-Video In/Out
- Composite Video Signal (CVBS) Input/Output (optional): BNC In/Out connector
- Component Signal (Y, Pb, Pr) Input/Output (optional): BNC In/Out connector (2 x 3)

8.1.6.2 Control connector

- RS-232 control: SubD 9 p In connector

8.1.6.3 Power connector

- 110/220Vac, 300W power supply: Universal AC Input

8.2 Mechanical specifications

8.2.1 Dimensions

The unit dimensions and the unit weight are depicted in the table below:

	mm	**inch**
Height	580.2	22.8
Width	1026.1	40.4
Depth	98	4.0

	kg	**lbs**
Weight	29,8	65.7

The mechanical drawings are given below:

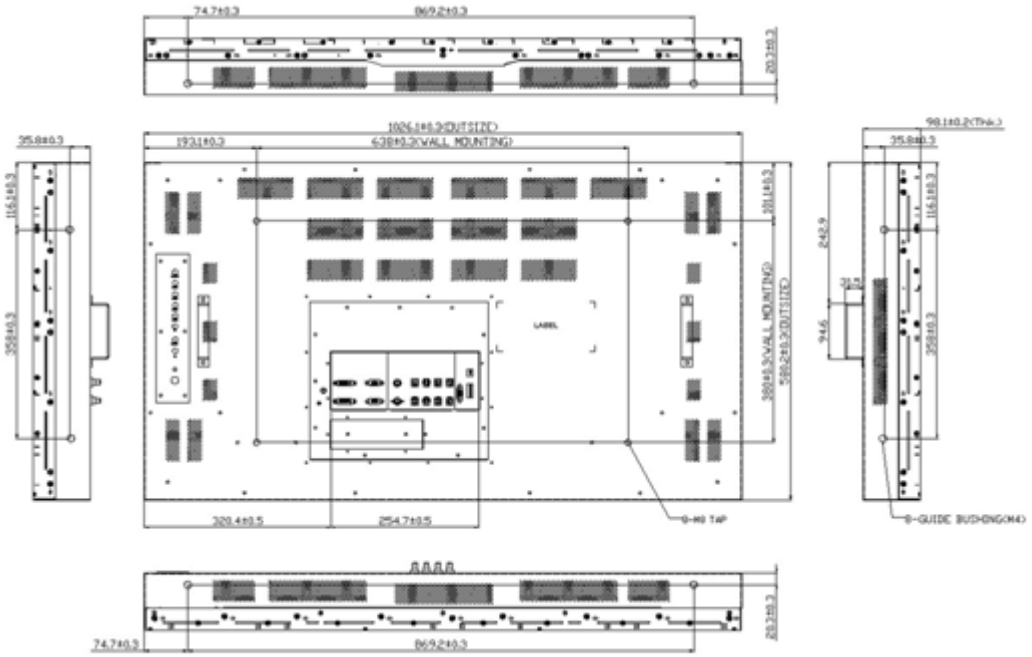


Figure 22: Dimensions NSL-4601

8.2.2 Components

- Industrial extended temperature range components are used (including plastic packaging).

8.2.3 Packing

- Drop test according to Barco specifications is performed on the overall packing.
- Unit packing is one packing responding to standards of international transport by air / sea / ground.

8.3 Environmental specifications

8.3.1 Storage temperature

- High temp: +60°C (+140°F)
- Low temp: -20°C (-4°F)

8.3.2 Operating temperature

- High temp.: +40°C (+104°F)
- Low temp.: +5°C (41°F)

8.3.3 Relative humidity operating

- Operating: 20 to 80% non-condensing

8.3.4 Relative humidity storage

- Storage: 10 to 90% non-condensing

8.3.5 Random vibration

- 0 - 0,0065 g^2/Hz (5-500 Hz random, 1 hour/axes, 3 axis)

8.3.6 Requirement for dusty environments

The room in which the display unit is installed and operational must be dust-free. The room must comply with a dust class of 8 or better according to ISO14644-1. If the room in which the display unit is installed does not comply with the dust class stated above, please contact Barco to discuss possibilities to protect the display unit against dust.

NOTE:

All construction, reconstruction, decoration activities must be completed before the installation and operation of the product.

8.3.7 EMI /EMC

The units are designed to meet following standards:

- USA:
  - ✓ FCC Class A (Part 15B)

- Europe CE:

EN55022	Conducted Emission
EN55022	Radiated Emission
EN 61000-3-2	Conducted Emission Harmonic Currents
EN 61000-3-3	Voltage Changes Fluctuation and Flicker
EN55024	Susceptibility
EN 61000-4-2	ESD
EN 61000-4-3	ElectroMagnetic Field
EN 61000-4-4	Burst
EN 61000-4-5	Surges
EN 61000-4-6	Conducted Common Mode
EN 61000-4-8	Power Frequency Magnetic Field
EN 61000-4-11	Voltage Dips

8.4 Other specifications

8.4.1 MTBF

> 50.000 hours

8.4.2 Maintenance

8.4.2.1 MTTR

- Less then 30 minutes.

8.4.2.2 Diagnostics

8.4.2.3 Use of maintenance equipment

8.4.2.4 Wear out items

- The backlight lifetime is 50 000 hours/lamp @ 25°C.
- The backlight is considered failed at 50% of the initial light output.
- Lifetime is depending on the brightness setting during operation.

8.4.2.5 Workmanship

- ccording to ANSI/IPC A-610A level II

9 Abbreviations and acronyms

°C	Degrees Celsius
°F	Degrees Fahrenheit
A	
ActEv	Actions + Events (name of a Barco software product)
AGC	Automatic Gain Control
ALC	Automatic Light Control
AMLCD	Active Matrix Liquid Crystal Display
ANSI	American National Standards Institute
APA	Automatic Phase Adjustment
AR	Anti Reflective
a-Si TFT	Amorphous Silicone Thin-Film Transistor
AWG	American Wire Gauge
B	
BARCO	Belgian-American Radio Corporation
BCM	Barco wall Control Manager
C	
CAN	Controller Area Network
CCFL	Cold Cathode Fluorescent Lamp
CCIR	Consulting Committee International
cd	candela
CE	Conducted Emissions, Conformity European (safety)
CIE	Commission International de l'Éclairage (Illumination)
CM	Console Mount
cm	centimeter
CMS	Control room Management Software
CoG	Combined sync on Green
CR	Contrast Ratio
CS	Combined Sync
CS	Conducted Susceptibility
CVBS	Composite Video Blanking Sync
D	
DAC	Digital to Analog Converter
DC	Direct Current
DDC	Display Data Channel

DM	Display Module
E	
EBU	European Broadcast Union
EDID	Extended Display Identification Data
EIA	Electronic Industries Association
EMI / EMC	Electromagnetic Interference / Electromagnetic Compatibility
EN	European Norms
ESD	Electrostatic Discharge
F	
FD	Full Duplex
FLIR	Forward Looking Infrared
FPDM	Flat Panel Display Measurements
G	
GPI	General Purpose Interface
H	
HD	Half Duplex
HDMI	High Definition Multimedia Interface
HDSDI	High Definition Serial Digital Interface
HE	Highly Efficient
HEA	High Efficiency Antireflective
HID	Human Interface Device
HMI	Human-Machine Interface
I	
ICD	Interface Control Document
IEC	International Electrotechnical Commission
IP	Ingress Protection
ISO	International Standard Organization
ITO	Indium Tin Oxide
ITU	International Telecommunications Union
K	
kg	kilogram
L	
L	Luminance
LCD	Liquid Crystal Display
LFC	LCD Flicker Compensation
LRU	Line Replaceable Unit
LUT	Look Up Table

Lux	Measure of illumination (lumens per meter squared)
M	
mm	millimeter
ms	milliseconds
MTBF	Mean-Time-Between-Failures
MTTR	Mean-Time-To-Repair
N	
NEMA	National Electronics Manufacturers Association
NSL	Near Seamless LCD
NTSC	National Television Systems Committee
O	
OSD	On-Screen Display
P	
PAL	Phase Alternating Lines
ppi	pixels per inch
PVA	Patterned Vertical Alignment
PVC	polyvinyl chloride
R	
RE	Radiated Emissions
RFU	Reserved for Future Use
RGB	Red, Green, Blue (letters/colors also referenced separately)
RH	Relative Humidity
RHDM	Reference High Definition Monitor
RM	Rack Mount
ROT	Rotator
RoHS	Restrictions of Hazardous Substances
RS	Radiated Susceptibility
S	
SDI	Serial Digital Interface
SDSDI	Standard Definition Serial Digital Interface
SG	Symbol Generator
SMPTE	Society of Motion Picture and Television Engineers
SS	Separate Sync
STANAG	Standardization Agreement
SVGA	Super Video Graphics Array
SXGA	Super eXtended Graphics Array
T	
TBC	To Be Confirmed

TBD	To Be Defined
TBM	To be Measured
TBT	To Be Tested
TTL	Transistor Transistor Logic
U	
UMD	Under Monitor Display
V	
VDC	Volts Direct Current
VESA	Video Electronics Standards Association
VM	VESA Mount
W	
W	Watt

10 Addendum

10.1 RS-232 protocol information

The addendum “RS232 Protocol NSL-4601” describes the RS-232 communication protocol with the NSL-4601 display.

The protocol is applicable for NSL-4601 units with firmware version V3.00 and higher.

RS232 Protocol NSL-4601

Document Version: 2010 02 16

Preface

Purpose of this Document

The purpose of this document is to provide a comprehensive description of the RS232 communication protocol with the NSL-4601 panels.

Document Conventions

The following styles and conventions are used in this document:

Used to point out limitations or problems or open points, which are of crucial importance.

Used to mark useful hints the reader should not oversee.

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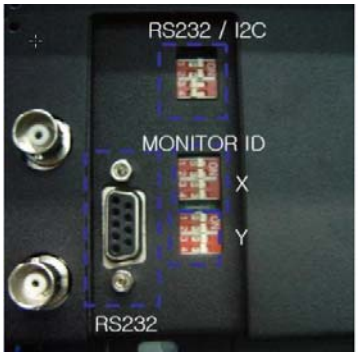
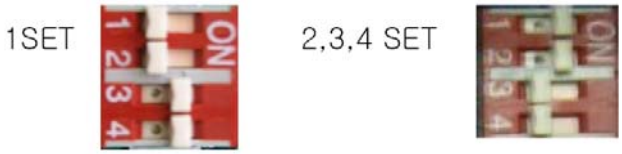
1 General

1.1 Addressing and chaining

1.1.1 Dip Switch for Master slave setting





1.1.2 Dip Switch for Device ID

Mapping between dip switches and device addresses

The following table shows how the dip-switch settings are mapped to device addresses

Vertical(Y) Dip Switches \ Horizontal (X) Dip Switches	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
2	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
3	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
4	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
5	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
6	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
7	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
8	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
9	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
10	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
11	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
12	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
13	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
14	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
15	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255

1.2 Com port settings

Protocol	RS232
Baud rate	9600bps
Data Bits	8 Bit
Parity bit	None
Stop bit	1 bit
Flow control	None

2 Concepts of command requests and replies

The protocol defines exactly two types of protocol units.

2.1 Direct Control Command Protocol

All requests that are send to the device have the following format:

Send to Monitor

Head	ID	Cmd	End
2 Byte	3 Byte	3 Byte	1 Byte

Head	All protocol units start with the same header-byte: “K:”
ID	3 Char identifier (“000”-“255”) is used for the device in the serial chain. “ALL” is used to send a command to all devices in the chain. In this case monitor doesn’t reply.
Cmd	3 Char command Identifier corresponding to the “original MWCP protocol”.
End	Type of command “.” for Set command and direct control commands.

Reply to PC (Only for single monitor) – reply within 3sec.

1)Ack type1.

ID	Cmd	Data	Data End	Ack
3~5 Bytes	4 Byte	1~3 Bytes	2 Byte	1 Byte

2)Ack type2

ID	Ack
3~5 Bytes	1 Byte

3) Nack

ID	Nack
3~5 Bytes	1 Byte

4)Skip: no reply.

ID	3~5 Char identifier (“(0)”-“(255)”) is used for the selected device in the serial chain. This ID show you the correct destination of command.
Cmd	4 Char command Identifier(“***=”) corresponding to the “original MWCP protocol”.
Data	1~3 Char command Identifier (“(0)”-“(255)”) corresponding to the “original MWCP protocol”.
Data End	2 Char command Identifier(“\r\n”) is used to define the end of data.

Ack/Nack	Ack : hexa 0x06 is used , The monitor received a valid command and was able to immediately process the command within given timeout conditions. Nack : hexa 0x15 is used. The monitor received correct head and ID command but received invalid format or unknown or unsupported command or parameter value. This answer is also send when the current device state does not allow the requested command. In this case search for logical programming errors and retry the command.
Skip	Case1: Incorrect Head command. Case2: Correct Head but ID is not match with monitor's set id. Case3: All set control command.

Ack type1.

This kind of command isneed return value command.

Ack type2.

This kind of command is no need return value command so reply only set ID and Ack or Nack.

2.2 Value Adjust Command Protocol

All answers that are received from the device have the following format:

Send to Monitor

Head	ID	Cmd	Data	End
2 Byte	3 Byte	3 Byte	3 Byte	1 Byte

Head	All protocol units start with the same header-byte: “K:”
ID	3 Char identifier (“000”-“255”) is used for the device in the serial chain. “ALL” is used to send a command to all devices in the chain. In this case monitor doesn’t reply.
Cmd	3 Char command Identifier corresponding to the “original MWCP protocol”.
Data	1~3 Char command Identifier (“(0)”-“(255)”) corresponding to the “original MWCP protocol”.
End	Type of command “.” for Set command and direct control commands.

Reply to PC (Only for single monitor)

1) Ack

ID	Cmd	Data	Data End	Ack
3~5 Bytes	4 Byte	1~3 Bytes	2 Byte	1 Byte

2) Nack

ID	Nack
3~5 Bytes	1 Byte

3) Skip: no reply.

ID	3~5 Char identifier (“(0)”-“(255)”) is used for the selected device in the serial chain. This ID show you the correct destination of command.
Cmd	4 Char command Identifier(“***=”) corresponding to the “original MWCP protocol”.
Data	1~3 Char command Identifier (“(0)”-“(255)”) corresponding to the “original MWCP protocol”.
Data End	2 Char command Identifier(“\r\n”) is used to define the end of data.
Ack/Nack	Ack : hexa 0x06 is used , The monitor received a valid command and was able to immediately process the command within given timeout conditions.

	Nack : hexa 0x15 is used. The monitor received correct head and ID command but received invalid format or unknown or unsupported command or parameter value. This answer is also send when the current device state does not allow the requested command. In this case search for logical programming errors and retry the command.
Skip	Case1: Incorrect Head command. Case2: Correct Head but ID is not match with monitor's set id. Case3: All set control command.

2.3 Status Check Command Protocol

All answers that are received from the device have the following format

Send to Monitor

Head	ID	Cmd	Data	End
2 Byte	3 Byte	3 Byte	3 Byte	1 Byte

Head	All protocol units start with the same header-byte: "K:"
ID	3 Char identifier ("000"-"255") is used for the device in the serial chain. "ALL" is used to send a command to all devices in the chain. In this case monitor doesn't reply.
Cmd	3 Char command Identifier corresponding to the "original MWCP protocol".
Data	1~3 Char command Identifier ("(0)"-"(255)") corresponding to the "original MWCP protocol".
End	Type of command "?" for Status check commands.

Reply to PC (Only for single monitor)

1) Ack type1.

ID
3~5 Bytes

Cmd	Data	Data End
4 Byte	1~3 Bytes	2 Byte

Ack
1 Byte

2) Ack type2 : This is used for updating all the same group menu items.

Reply to PC (Only for single monitor)

ID
3~5 Bytes

Cmd[0]	Data[0]	Data End[0]
4 Byte	1~3 Bytes	2 Byte

Cmd[1]	Data[1]	Data End[1]
4 Byte	1~3 Bytes	2 Byte

..

.

Cmd[n]	Data[n]	Data End[n]
4 Byte	1~3 Bytes	2 Byte

Ack
1 Byte

3) Nack

ID	Nack
3~5 Bytes	1 Byte

4) Skip : no reply.

ID	3~5 Char identifier (“(0)”-“(255)”) is used for the selected device in the serial chain. This ID show you the correct destination of command.
Cmd **or** **Cmd[n]**	4 Char command Identifier(“***=”) corresponding to the “original MWCP protocol”.
Data **or** **Data[n]**	3~5 Char command Identifier (“(0)”-“(255)”) corresponding to the “original MWCP protocol”.
Data End **or** **Data End[n]**	2 Char command Identifier(“\r\n”) is used to define the end of data.
Ack/Nack	Ack : hexa 0x06 is used , The monitor received a valid command and was able to immediately process the command within given timeout conditions. Nack : hexa 0x15 is used. The monitor received correct head and ID command but received invalid format or unknown or unsupported command or parameter value. This answer is also send when the current device state does not allow the requested command. In this case search for logical

	programming errors and retry the command.
Skip	Case1: Incorrect Head command. Case2: Correct Head but ID is not match with monitor's set id. Case3: All set control command.

2.4 Different command types

In principle there are four different types of commands they all make use of the same protocol unit format.

2.4.1 Direct Control Commands

These commands don't have any data in the command request and can have data in the command result.

Example1: Set Mode Command(Source change) – return set id and ack/nack.

In order to change the input source the following PU is send to the device(set id = 000):

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	SDV	.

This answer is retuned from the device(set id = 000). It indicates that changing the input source to DVI did succeed(in case ack).

ID (char-3~5Bytes)	ACK (Hexa-1Byte)
(0)	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

*** Monitor return source code ***

Didprintf("(%d)",GetSETID()); // Set Id

putchar(ACK); or putchar(NACK); // Ack or Nack.

Ack : Command excute ok.

Nack : Head and ID are correct but others command are not correct format.

If Head or ID commands are incorrect(format or range) monitor don't reply.

Because monitor consider other type control command(ex auto calibration) if Head is not correct(format or range).

And Monitor consider other monitor control command if ID is not correct(format or range).

Ex1) Set id = 10 , source change DVI.

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	010	SDV	.

ID (char-3~5Bytes)	ACK (Hexa-1Byte)
(10)	0x06

Ex2) Set id = 100 , source change DVI.

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	100	SDV	.

ID (char-3~5Bytes)	ACK (Hexa-1Byte)
(100)	0x06

*** Same format command list ***

No	Command	Description	No	Command	Description
1	PON / POF	Power On / Off	21	SUC	Save Color tone Red/Green/Blue – Note1
2	SPC	Source change to PC	22	SFC	Save Factory color control all items – Note1
3	SDV	Source change to DVI	23	NTN	On Timer On
4	SC1	Source change to COMPONENT	24	NTF	On Timer Off
5	SSV	Source change to S-VIDEO	25	FTN	Off Timer On
6	SAV	Source change to CVBS	26	FTF	Off Timer Off
7	ATU	Auto Adjust (only VGA input)	27	GAN	1:1 Gap adjust On – Note2
8	RPW	Remote control Power key	28	GAF	1:1 Gap adjust Off – Note2
9	RSO	Remote control Source Key	29		
10	RUP	Remote control Up key	30		
11	RDN	Remote control Down key	31		
12	RRT	Remote control Right key	32		
13	RLT	Remote control Left key	33		
14	REN	Remote control Select key	34		
15	RMN	Remote control Menu key	35		
16	RAU	Remote control Auto key	36		
17	RIF	Remote control Info key	37		
18	EIN	Reset(Color)	38		
19	GSV	Gamma LUT save	39		
20	SCB	Save Contrast and Brightness data – Note1	40		

Example2: Mode Select Command(Picture Mode) – return set id , setting status and ack/nack.

In order to increase the brightness by 1 the following PU is send to the device(set id = 000):

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	PM0	.

This answer is retuned from the device(set id = 000). It indicates that changing the picture mode did succeed. The updated picture mode is returned in 1 char data byte.

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1Byte)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	PIM=	0	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

*** Monitor return source code ***

Didprintf("(%d)",GetSETID()); // Set Id

Didprintf("PIM=%d\r\n", GetPictureMode ()); // Picture Mode

putchar(ACK); or putchar(NACK); // Ack or Nack.

Ack : Command excute ok.

Nack : Head and ID are correct but others command is not correct format.

If Head or ID commands are incorrect(format or range) monitor don't reply.

Because monitor consider other type control command(ex auto calibration) if Head is not correct(format or range).

And Monitor consider other monitor control command if ID is not correct(format or range).

Ex1) Set id = 10 , change picture mode to USER mode.

Head (char-2Bytes)	**ID (char-3Bytes)**	**Cmd (char-3Bytes)**	**Cmd end (char-1Byte)**
K:	010	PM0	.

ID (char-3~5Bytes)	**Return Cmd (char-4Bytes)**	**Data (char-1~3Bytes)**	**Data End (char-2Bytes "\r\n")**	**ACK (Hexa-1Byte)**
(10)	PIM =	9	\r\n	0x06

or

ID (char-3~5Bytes)	**NACK (Hexa-1Byte)**
(0)	0x15

Ex2) Set id = 100 , change picture mode to USER mode.

Head (char-2Bytes)	**ID (char-3Bytes)**	**Cmd (char-3Bytes)**	**Cmd end (char-1Byte)**
K:	100	PM0	.

ID (char-3~5Bytes)	**Return Cmd (char-4Bytes)**	**Data (char-1~3Bytes)**	**Data End (char-2Bytes "\r\n")**	**ACK (Hexa-1Byte)**
(100)	PIM =	100	\r\n	0x06

or

ID (char-3~5Bytes)	**NACK (Hexa-1Byte)**
(0)	0x15

*** Same format command list ***

No	**Command**	**Description**	**Return Cmd and Data**
1	CT0	Color temperature set to USER	CRT=0
2	CT1	Color temperature set to COOL1	CRT=2
3	CT2	Color temperature set to COOL2	CRT=1
4	CT3	Color temperature set to Normal	CRT=3
5	CT4	Color temperature set to WARM1	CRT=4
6	CT5	Color temperature set to WARM2	CRT=5
7	PM0	Picture Mode USER	PIM=0

8	PM1	Picture Mode DYNAMIC/ HIGH(pc/dvi)	PIM=1
9	PM2	Picture Mode STANDARD/ MIDDLE(pc/dvi)	PIM=2
10	PM3	Picture Mode MOVIE/ LOW(pc/dvi)	PIM=3
11	PM4	Picture Mode MILD/ MIDDLE(pc/dvi)	PIM=4 / PIM=2(pc/dvi)
12	PS0	Size set to WIDE(All source)	PIS=0
13	PS1	Size set to 4:3(All source)	PIS=1
14	PS2	Size set to ZOOM / WIDE(p/,dvi)	PIS=2 / PIS=0(pc/dvi)
15	PS3	Size set to PANORAMA / WIDE(pc/dvi) / ZOOM(component 1080i/1080p)	PIS=3 / PIS=0(pc/dvi) / PIS=4 (component 1080i/1080p)
16	PS4	Size set to 14:9 / WIDE(pc/dvi)	PIS=4 / PIS=0(pc/dvi)
17	KLN / KLF	Osd Key Lock On/Off	KLC=1 / KLC=0
18	FMN	Factory Mode On	FMS=1
19	FMF	Factory Mode Off	FMS=0
20	AGW	Aging mode Full White	AGI=0
21	AGR	Aging mode Full Red	AGI=1
22	AGG	Aging mode Full Green	AGI=2
23	AGG	Aging mode Full Blue	AGI=3
24	AGF	Aging mode Off	AGI=4
25	NS0	On Source PC	NSR=0
26	NS1	On Source DVI	NSR=1
27	NS2	On Source COMPINENT	NSR=2
28	NS3	On Source S-VIDEO	NSR=3
29	NS4	On Source AV	NSR=4
30	MD0	Mode Auto	MDE=0
31	MD1	Mode 1368x768	MDE=1
32	MD2	Mode 1366x768	MDE=2
33	MD3	Mode 1360x768	MDE=3
34	MD4	Mode 12808x768	MDE=4
35	MD5	Mode 1024x768	MDE=5

Example3: Value Increase Decrease Command(Brightness)

– return set id , setting value and ack/nack.

In order to increase the brightness by 1 the following PU is send to the device(set id = 000):

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	BRU	.

This answer is retuned from the device(set id = 000). It indicates that increasing the brightness did succeed. The updated brightness value is returned in 1~3 char data byte.

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	BRT=	54	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

***Monitor return source code ***

Didprintf("(%d)",GetSETID()); // Set Id

Didprintf("BRT=%d\r\n",GetPictureBrightnessValue()); // Brightness Value

putchar(ACK); or putchar(NACK); // Ack or Nack.

Ack : Command excute ok.

Nack : Head and ID are correct but others command is not correct format.

If Head or ID commands are incorrect(format or range) monitor don't reply.

Because monitor consider other type control command(ex auto calibration) if Head is not correct(format or range).

And Monitor consider other monitor control command if ID is not correct(format or range).

Ex1) Set id = 10 , Brightness change 8 to 9.

Head (char-2Bytes)	**ID (char-3Bytes)**	**Cmd (char-3Bytes)**	**Cmd end (char-1Byte)**
K:	010	BRU	.

ID (char-3~5Bytes)	**Return Cmd (char-4Bytes)**	**Data (char-1~3Bytes)**	**Data End (char-2Bytes "\r\n")**	**ACK (Hexa-1Byte)**
(10)	BRT=	9	\r\n	0x06

or

ID (char-3~5Bytes)	**NACK (Hexa-1Byte)**
(0)	0x15

Ex2) Set id = 100 , Brightness change 99 to 100.

Head (char-2Bytes)	**ID (char-3Bytes)**	**Cmd (char-3Bytes)**	**Cmd end (char-1Byte)**
K:	100	BRU	.

ID (char-3~5Bytes)	**Return Cmd (char-4Bytes)**	**Data (char-1~3Bytes)**	**Data End (char-2Bytes "\r\n")**	**ACK (Hexa-1Byte)**
(100)	BRT=	100	\r\n	0x06

or

ID (char-3~5Bytes)	**NACK (Hexa-1Byte)**
(0)	0x15

*** Same format command list ***

No	**Command**	**Description**	**Return Cmd**
1	MHU / MHD	Multi window H Cell max 1step Up/Down	MHC=
2	MVU / MVD	Multi window V Cell max 1step Up/Down	MVC=
3	DNU / DND	Multi window Cell No 1step Up/ Down	DNO=
4	HEU / HED	Multi window H Gap(Edge) 1step Up/ Down	MHG=
5	VEU / VED	Multi window V Gap(Edge) 1step Up/	MVG=

		Down	
6	CTU / CTD	Contrast 1step Up/Down	CON=
7	BRU / BRD	Brightness 1step Up/ Down	BRT=
8	HUU / HUD	Tint(Hue) 1step Up/ Down	TIN=
9	STU / STD	Saturation(Color) 1step Up/ Down	SAT=
10	SPU / SPD	Sharpness 1step Up/ Down	SHA=
11	BLU / BLD	Backlight 1step Up/ Down	BLT=
12	SBU / SBD	Sub Brightness 1step Up/ Down	SBR=
13	ROU / ROD	Red Offset 1step Up/Down	ROF=
14	GOU / GOD	Green Offset 1step Up/Down	GOF=
15	BOU / BOD	Blue Offset 1step Up/Down	BOF=
16	SCU / SCD	Sub Contrast 1step Up/Down	SCO=
17	RGU / RGD	Red Gain 1step Up/Down	RGN=
18	GGU / GGD	Green Gain 1step Up/Down	GGN=
19	BGU / BGD	Blue Gain 1step Up/Down	BGN=
20	HPU / HPD	H-Position 1step Up/Down(pc only)	HPS=
21	VPU / VPD	V-Position 1step Up/Down(pc only)	VPS=
22	CKU / CKD	Clock 1step Up/Down(pc only)	CLK=
23	PHU / PHD	Phase1step Up/Down(pc only)	PHS=
24	THU / THD	Time Hour Up/ Down	TIH=
25	TMU / TMD	Time Minute Up/ Down	TIM=
26	NHU / NHD	On Timer Hour Up/ Down	NTH=
27	NMU / NMD	On Timer Minute Up/ Down	NTM=
28	FHU / FHD	Off Timer Hour Up/ Down	FTH=
29	FMU / FMD	Off Timer Minute Up/ Down	FTM=
30	URU / URD	Color Tone Red Up/ Down)	URE=
31	UGU / UGD	Color Tone Green Up/ Down	UGR=
32	UBU / UBD	Color Tone Blue Up/ Down	UBL=

2.4.2 Value Adjust Commands

Example: Set Brightness

In order to set the brightness to 100 the following PU is send to the device:

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Data (char-3Bytes)	Cmd end (char-1Byte)
K:	000	BRT	054	.

This answer is retuned from the device. It indicates that increasing the brightness did succeed. The updated brightness is returned in 1~3 char data byte.

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	BRT=	54	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

*** Monitor return source code ***

Didprintf("(%d)",GetSETID()); // Set Id

Didprintf("BRT=%d\r\n",GetPictureBrightnessValue()); // Brightness Value

putchar(ACK); or putchar(NACK); // Ack or Nack.

Ack : Command excute ok.

Nack : Head and ID are correct but others command is not correct format.

If Head or ID commands are incorrect(format or range) monitor don't reply.

Because monitor consider other type control command(ex auto calibration) if Head is not correct(format or range).

And Monitor consider other monitor control command if ID is not correct(format or range).

Ex1) Set id = 10 , Brightness change to 9.

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Data (char-3Bytes)	Cmd end (char-1Byte)
K:	010	BRT	009	.

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(10)	BRT=	9		0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

Ex2) Set id = 100 , Brightness change to 100.

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Data (char-3Bytes)	Cmd end (char-1Byte)
K:	100	BRT	100	.

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(100)	BRT=	100		0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

*** Same format command list ***

No	Command	Description(range)	Return Cmd
1	MHC	Multi window H Cell max (1 ~ 16)	MHC=
2	MVC	Multi window V Cell max (1 ~ 16)	MVC=
3	DNO	Multi window Cell No (1 ~ 256)	DNO=
4	MHG	Multi window H Gap(Edge) (0 ~ 40)	MHG=
5	MVG	Multi window V Gap(Edge) (0 ~ 40)	MVG=
6	CON	Contrast value Setting (0 ~ 100)	CON=
7	BRT	Brightness value Setting(0 ~ 100)	BRT=
8	TIN	Tint(Hue) Setting (PC/DVI : 50 fixed ,COMPONENT/S-VIDEO/AV : 0 ~ 100)	TIN=
9	SAT	Saturation(Color) Setting (PC/DVI/ COMPONENT : 50 fixed , S-VIDEO/AV : 0 ~ 100)	SAT=
10	SHA	Sharpness value Setting (PC/DVI : 50 fixed ,COMPONENT/S-VIDEO/AV : 0 ~ 100)	SHA=
11	BLT	Back Light Setting (0 ~ 100)	BLT=
12	SBR	Sub Brightness Setting (0 ~ 75)	SBR=
13	ROF	Red Offset Setting (0 ~ 80)	ROF=
14	GOF	Green Offset Setting (0 ~ 80)	GOF=
15	BOF	Blue Offset Setting (0 ~ 80)	BOF=
16	SCO	Sub Contrast Setting (0 ~ 75)	SCO=
17	RGN	Red Gain Setting (0 ~ 80)	RGN=
18	GGN	Green Gain Setting (0 ~ 80)	GGN=
19	BGN	Blue Gain Setting (0 ~ 80)	BGN=
20	HPS	H-Position Setting(Only for PC : 0 ~ 100)	HPS=
21	VPS	V-Position Setting(Only for PC : 0 ~ 100)	VPS=
22	CLK	Clock Setting(Only for PC : 0 ~ 100)	CLK=
23	PHS	Phase Setting(Only for PC : 0 ~ 100)	PHS=
24	TIH	Timer Hour(0 ~ 23)	TIH=
25	TIM	Timer Minute(0 ~ 59)	TIM=
26	NTH	On Timer Hour(0 ~ 23)	NTH=
27	NTM	On Timer Minute(0 ~ 59)	NTM=
28	FTH	Off Timer Hour(0 ~ 23)	FTH=
29	FTM	Off Timer Minute(0 ~ 59)	FTM=
30	URE	Color Tone Red Setting(0 ~ 100)	URE=
31	UGR	Color Tone Green Setting (0 ~ 100)	UGR=
32	UBL	Color Tone Blue Setting (0 ~ 100)	UBL=

2.4.3 Status Check Commands

Example1: Get Brightness

In order to query the current brightness the following PU is send to the device:

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	BRT	?

This answer is retuned from the device. It indicates that the request did succeed and the current brightness (0x36) is returned in 1~3 char data byte.

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	BRT=	54	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

Ex1) Set id = 10 , current brightness request.

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	010	BRT	?

Set id = 10 , current brightness(0x09) reply.

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(10)	BRT=	9	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

Ex2) Set id = 100 , current brightness request.

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	100	BRT	?

Set id = 10 , current brightness(0x64) reply

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(100)	BRT=	100	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

*** Same format command list ***

No	Command	Description
1	MHC	Multi window H Cell max value
2	MVC	Multi window V Cell max value
3	DNO	Cell No value
4	MHG	Multi window H Gap value
5	MVG	Multi window V Gap value
	GAD	1:1 Gap Adjust setting status
6	CON	Contrast Value
7	BRT	Brightness value
8	SAT	Saturation(Color) value
9	TIN	Tint(Hue) value
10	SHA	Sharpness value
11	BLT	Backlight value
12	SBR	Sub Brightness value
13	ROF	Red Offset value
14	GOF	Green Offset value
15	BOF	Blue Offset value
16	SCO	Sub Contrast value
17	RGN	Red Gain value
18	GGN	Green Gain value

19	BGN	Blue Gain value
20	PSZ	Picture Size Setting status
21	CRT	Color temperature Setting status
22	AGI	Aging mode Setting status
23	MDT	Monitor Device Type Read.
24	FWV	Firmware Version Read
25	CSR	Current Source status
26	CPS	Current Power status
27	MLT	MHC,MVC,MHG,MVG,DNO
28	COL	BRT,CON,TIN,SAT,SHA,CRT,BLT,SBR,ROF,GOF,BOF,SCO,RGN,GGN,BGN,URE,UGR,UBL
29	PIC	PIM,PIS,HPS,VPS,CLK,PHS
30	ETC	CPS,CSR,AGI.KLC,MDE,TIH,TUM,NTH,NTM,NTI,FTH,FTM,FTI,NSR,NSG,MDT

Example2: Get Menu Group setting status

In order to query the Multi set menu group setting status the following PU is send to the device:

Head (char-2Bytes)	**ID (char-3Bytes)**	**Cmd (char-3Bytes)**	**Cmd end (char-1Byte)**
K:	000	MLT	?

This answer is retuned from the device. It indicates that the request did succeed and the current Set Id, HMaxCell, VMaxCell, H Gap, V Gap, Cell No and Ack/Nack is returned.

ID (char-3~5Bytes)
(0)

Return Cmd (char-4Bytes)	**Data (char-1~3Bytes)**	**Data End (char-2Bytes "\r\n")**
MHC=	2	\r\n
MVC=	2	
MHG=	1	
MVG=	1	
DNO=	2	
GAD=	1	

ACK (Hexa-1Byte)
0x06

or

ID (char-3~5Bytes)	**NACK (Hexa-1Byte)**
(0)	0x15

In order to query the Color set menu group setting status the following PU is send to the device:

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	COL	?

This answer is returned from the device. It indicates that the request did succeed and the current Set Id, Brightness, Contrast, Hue(Tint), Saturation(Color), Sharpness, Coor

Temperature,Sub Brightness, Red Offset, Green Offset, Blue Offset, Sub Contrast, Red Gain, Green Gain, Blue Gain, Back Light and Ack/Nack is returned.

ID (char-3~5Bytes)
(0)

Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")
BRT=	50	\r\n
CON=	50	\r\n
TIN=	50	\r\n
SAT=	50	\r\n
SHA=	50	\r\n
CRT=	1	\r\n
BLT=	72	\r\n
SBR=	24	\r\n
ROF=	35	\r\n
GOF=	25	\r\n
BOF=	26	\r\n
SCO=	34	\r\n
RGN=	27	\r\n
GGN=	28	\r\n
BGN=	17	\r\n
URE=	50	\r\n
UGR=	50	\r\n
UBL=	50	\r\n

ACK (Hexa-1Byte)
0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

In order to query the Picture set group setting status the following PU is send to the device:

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	PIC	?

This answer is retuned from the device. It indicates that the request did succeed and the current Set Id, Picture Mode, Picture Size, H Position(only PC), V Position(only PC), Clock (only PC), Phase(only PC), and Ack/Nack is returned.

ID (char-3~5Bytes)
(0)

Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")
PIM=	2	\r\n
PIS=	0	\r\n
HPS=	50	\r\n
VPS=	50	\r\n
CLK=	50	\r\n
PHS=	50	\r\n

ACK (Hexa-1Byte)
0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

In order to query the IR/Key set group setting status the following PU is send to the device:

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	RMC	?

This answer is retuned from the device. It indicates that the request did succeed and the current Factory Mode status and Ack/Nack is returned.

ID (char-3~5Bytes)
(0)

Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")
FMS=	0	\r\n

ACK (Hexa-1Byte)
0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

In order to query the ETC set group setting status the following PU is send to the device:

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	ETC	?

This answer is retuned from the device. It indicates that the request did succeed and the current Set Id, Current Power Status, Current Source, Aging Mode Status, Key Lock Status and Ack/Nack is returned.

ID (char-3~5Bytes)
(0)

Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")
CPS=	1	\r\n
CSR=	1	\r\n
AGI=	0	\r\n
KLC=	0	\r\n
TIH=	23	\r\n
TIM=	59	\r\n
NTH=	23	\r\n
NTM=	59	\r\n
NTI=	0	\r\n
FTH=	23	\r\n
FTM=	59	\r\n
FTI=	0	\r\n
NSR=	1	\r\n
MDE=	1	\r\n
NSG=	0	\r\n

ACK (Hexa-1Byte)
0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

2.4.4 Broadcast Command to all devices in the serial chain

These commands are not addressed to an individual device in the chain but instead will be processed by all devices. Broadcast commands will not give any replies or acknowledges. Thus only direct control commands and value adjust commands can be send in this way.

Example: Power On all

In order to Power on all in the chain, the device-ID is set to “0”. Broadcast commands will not be acknowledged with a reply from the device.

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	ALL	PON	.

Example1: Source change to DVI all set

In order to change the input source to DVI all in the chain the following PU is send to the chain:

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	ALL	SDV	.

Example2: Picture mode change to USER all set

In order to change the picture mode to USER all in the chain the following PU is send to the chain:

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	ALL	PM0	.

Example3: Brightness increase all set

In order to increase the brightness all in the chain the following PU is send to the chain:

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	ALL	BRU	.

Example4: Change the brightness value to 54(0x36) all set

In order to change the brightness value to 54(0x36) all in the chain the following PU is send to the chain:

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Data (char-3Bytes)	Cmd end (char-1Byte)
K:	ALL	BRT	054	.

3 Command Reference

The command reference lists all commands, with a short explanation of their effect and details about the command request protocol unit and the command reply protocol unit. The command reference is organized.

3.1 Operation Modes

3.1.1 Read (only ONE SET selected)

- **Multi Control Menu (**in case HMaxCell=2, VMaxCell=2, H Gap=1, H Gap=0, Cell No=2**)**

Send command to Monitor(current Brightness is 54(0x36))

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	MLT	?

Reply to PC

ID (char-3~5Bytes)
(0)

Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")
MHC=	2	\r\n
MVC=	2	
MHG=	1	
MVG=	1	
DNO=	2	
GAD=	1	

ACK (Hexa-1Byte)
0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

- **Color Control Menu**

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	COL	?

Reply to PC

ID (char-3~5Bytes)
(0)

Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")
BRT=	50	\r\n
CON=	50	\r\n
TIN=	50	\r\n
SAT=	50	\r\n
SHA=	50	\r\n
CRT=	1	\r\n
BLT=	72	\r\n
SBR=	24	\r\n
ROF=	35	\r\n
GOF=	25	\r\n
BOF=	26	\r\n
SCO=	34	\r\n
RGN=	27	\r\n
GGN=	28	\r\n
BGN=	17	\r\n
URE=	50	\r\n
UGR=	50	\r\n
UBL=	50	\r\n

ACK (Hexa-1Byte)
0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

- **Picture Control Menu**

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	PIC	?

Reply to PC

ID (char-3~5Bytes)
(0)

Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")
PIM=	2	\r\n
PIS=	0	\r\n
HPS=	50	\r\n
VPS=	50	\r\n
CLK=	50	\r\n
PHS=	50	\r\n

ACK (Hexa-1Byte)
0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

- **IR/Key Control Menu**

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	RMC	?

Reply to PC

ID (char-3~5Bytes)
(0)

Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")
FMS=	1	\r\n

ACK (Hexa-1Byte)
0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

- **ETC Control Menu**

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	ETC	?

Reply to PC

ID (char-3~5Bytes)
(0)

Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")
CPS=	1	\r\n
CSR=	1	\r\n
AGI=	0	\r\n
KLC=	0	\r\n
TIH=	23	\r\n
TIM=	59	\r\n

NTH=	23	\r\n
NTM=	59	\r\n
NTI=	0	\r\n
FTH=	23	\r\n
FTM=	59	\r\n
FTI=	0	\r\n
NSR=	1	\r\n
MDE=	1	\r\n
NSG=	0	\r\n

ACK (Hexa-1Byte)
0x06

or

ID (char-3~5Bytes)	**NACK (Hexa-1Byte)**
(0)	0x15

-

3.1.2 Power Control

1) Power On/Off

- **All set in chain**

Send to Monitor.

Head (char-2Bytes)	**ID (char-3Bytes)**	**Cmd (char-3Bytes)**	**Cmd end (char-1Byte)**
K:	ALL	PON	.

Cmd (char-3Bytes)	**Power Status**
POF	Off
PON	On

No Reply to PC.

- **One set**

Send to Monitor.

Head (char-2Bytes)	**ID (char-3Bytes)**	**Cmd (char-3Bytes)**	**Cmd end (char-1Byte)**
K:	000	PON	.

Cmd (char-3Bytes)	**Power Status**
POF	Off
PON	On

Reply to PC.

1)Ack

ID (char-3~5Bytes)	ACK (Hexa-1Byte)
(0)	0x06

2)Nack

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

- **Group set**

Repeat one set command to all selected set.

2) Get Power Status of one set

Send to Monitor.

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	CPS	?

Reply to PC.

1)Ack

ID (char-3~5Bytes)	Cmd (char-4Bytes)	Data (char-1Byte)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	CPS=	0	\r\n	0x06

Data (char-1Byte)	Power Status
0	Off
1	On

2)Nack

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

3.1.3 Source Setting (PC,DVI,COMPONENT,S-VIDEO,CVBS)

1) Source change

- **All set in chain**

Send to Monitor.

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	ALL	SDV	.

Cmd (char-3Bytes)	Source
SPC	PC
SDV	DVI
SC1	COMPONENT
SSV	S-VIDEO
SAV	AV

No Reply to PC.

- **One set**

Send to Monitor.

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	SDV	.

Cmd (char-3Bytes)	Source
SPC	PC
SDV	DVI
SC1	COMPONENT
SSV	S-VIDEO
SAV	AV

Reply to PC.

1)Ack

ID (char-3~5Bytes)	ACK (Hexa-1Byte)
(0)	0x06

2)Nack

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

- **Group set**

Repeat one set command to all selected set.

3) Get Current Source Status of one set

Send to Monitor.

Head (char-2Bytes)	ID (char-3Bytes)	Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	CPS	?

Reply to PC.

1)Ack

ID (char-3~5Bytes)	Cmd (char-4Bytes)	Data (char-1Byte)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	CPS=	0	\r\n	0x06

Data (char-1Byte)	Source
0	PC
1	DVI
2	COMPONENT
3	S-VIDEO
4	AV

2)Nack

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

3.2 Multi Window setting

3.2.1 Multi Window Adjust H Max cell(Range 1~16, Default value = 1)

- **Up**

Send to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	MHU	.

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	MHU=	2	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

- **Down**

Send to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	MHD	.

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	MHD=	2	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

- **Edit(Number key and then press Enter key)**

Send to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Data (char-3Bytes)	Cmd end (char-1Byte)
K:	000	MHC	002	.

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	MHC=	2	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

- **Get current H Max Cell setting status**

See Read Multi setting status**.**

3.2.2 Multi Window Adjust V Max cell(Range 1~16, Default value = 1)

Same format as Multi Window Adjust H Max cell

but send cmd is "MVU", "MVD", "MVC" and return cmd is "MVC=".

3.2.3 Multi Window Adjust Cell Number(Range 1~ H Max cell x V Max cell, Default value = 1)

Same format as Multi Window Adjust H Max cell

but send cmd is "DNU", "DND", "DNO" and return cmd is "DNO=" .

3.2.4 Multi Window Adjust H Gap(Range 0~40, Default value = 0)

Same format as Multi Window Adjust H Gap

but send cmd is "HEU", "HED", "MHG" and return cmd is "MHG =".

3.2.5 Multi Window Adjust V Gap(Range 0~40, Default value = 0)

Same format as Multi Window Adjust H Gap

but send cmd is "VEU", "VED", "MVG" and return cmd is "MVG =".

3.2.6 1:1 Gap Adjust On/Off

This function is for setting H/V Gap adjust Enable or Disable. If this function is enabled monitor does not divide the display window but H/V gap can be adjusted. But if this function is disabled H/V gap can't be adjusted at HMaxCell = 1 and VMaxCell=1 status.

3.2.7 Multi Window Adjust Apply

This function is for setting all multi set items(H Max Cell, V Max Cell, Cell No, H Gap, V Gap) at once.

1) All Set Control

Send PC to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	ALL	VMB	.

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Data (char-3Bytes)	Cmd end (char-1Byte)
K:	ALL	MHC	002	.

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Data (char-3Bytes)	Cmd end (char-1Byte)
K:	ALL	MVC	002	.

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Data (char-3Bytes)	Cmd end (char-1Byte)
K:	ALL	DNO	001	.

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Data (char-3Bytes)	Cmd end (char-1Byte)
K:	ALL	MHG	000	.

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Data (char-3Bytes)	Cmd end (char-1Byte)
K:	ALL	MVG	000	.

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	ALL	VMF	.

No reply from Monitor.

2) Group control

Repeat One set control to all selected set.

3) One set control

Send PC to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	VMB	.

Reply Monitor to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	VMT=	1	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

Send PC to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Data (char-3Bytes)	Cmd end (char-1Byte)
K:	000	MHC	002	.

Reply Monitor to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	MHC=	2	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

Send PC to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Data (char-3Bytes)	Cmd end (char-1Byte)
K:	000	MVC	002	.

Reply Monitor to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	MVC=	2	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

Send PC to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Data (char-3Bytes)	Cmd end (char-1Byte)
K:	000	DNO	001	.

Reply Monitor to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	DNO =	1	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

Send PC to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Data (char-3Bytes)	Cmd end (char-1Byte)
K:	000	MHG	002	.

Reply Monitor to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	MHG=	2	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

Send PC to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Data (char-3Bytes)	Cmd end (char-1Byte)
K:	000	MVG	002	.

Reply Monitor to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	MVG=	2	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

Send PC to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	VMF	.

Reply Monitor to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	VMT=	0	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

3.2.8 Read Multi setting status(only for single monitor)

This function is for updating current multi setting status of selected one monitor. This is not available in all set or group selected.

See 3.1.1 Read (only ONE SET selected)

3.3 COLOR

3.3.1 COLOR TEMPERATURE(USER-COOL2-COOL1-NORMAL-WARM2-WARM1, Default = COOL2)

Send to monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	CT0	.

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	CRT=	1	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

Send Cmd (char-3Bytes)	MODE	Reply (CRT=*)
CT0	USER	0
CT1	COOL1	1
CT2	COOL2	2
CT3	NORMAL	3
CT4	WARM1	4
CT5	WARM2	5

3.3.2 BRIGHTNESS(Range 0~100, Default value = 50)

- **Up**

Send to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	BRU	.

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	BRU=	2	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

- **Down**

Send to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	BRD	.

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	BRD=	2	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

- **Edit(Number key and then press Enter key)**

Send to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Data (char-3Bytes)	Cmd end (char-1Byte)
K:	000	BRT	002	.

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	BRT=	2	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

- **Get current Brightness setting status**

See Read Color setting status**.**

3.3.3 CONTRAST(Range 0~100, Default value = 50)

Same format as COLOR BRIGHTNESS SETTING.

but send cmd is "CTU", "CTD", "CON" and return cmd is "CON=".

3.3.4 HUE(Range 0~100, Default value = 50)

Same format as COLOR BRIGHTNESS SETTING.

but send cmd is "TIU", "TID", "TIN" and return cmd is "TIN=".

This function is for only COMPONENT,S-VIDEO,AV. This function can't adjust at PC and DVI(fixed to 50).

3.3.5 SATURATION(Range 0~100, Default value = 50)

Same format as COLOR BRIGHTNESS SETTING.

but send cmd is “STU”, “STD”, “SAT” and return cmd is “SAT=”.

This function is for only COMPONENT,S-VIDEO,AV. This function can’t adjust at PC and DVI(fixed to 50).

3.3.6 SHARPNESS(Range 0~100, Default value = 50)

Same format as COLOR BRIGHTNESS SETTING.

but send cmd is “SPU”, “SPD”, “SHA” and return cmd is “SHA=”.

This function is for only COMPONENT,S-VIDEO,AV. This function can’t adjust at PC and DVI(fixed to 50).

3.3.7 SUB BRIGHTNESS(Range 0~75, MWCP default value is 30. But monitor’s default value is different as current source. So if you want to know current value, you have to read single set value.)

Same format as COLOR BRIGHTNESS SETTING.

but send cmd is “SBU”, “SBD”, “SBR” and return cmd is “SBR=”.

This function is used to adjust color only factory line or service. Don’t open to normal user.

This function is used to adjust picture brightness offset of scaler.

3.3.8 RED, GREEN, BLUE OFFSET(Range 0~80, MWCP default value is 40. But monitor’s default value is different as current source. So if you want to know current value, you have to read single set value)

- RED

  Same format as COLOR BRIGHTNESS SETTING.

  but send cmd is “ROU”, “ROD”, “ROF” and return cmd is “ROF=”.
- GREEN

  Same format as COLOR BRIGHTNESS SETTING.

  but send cmd is “GOU”, “GOD”, “GOF” and return cmd is “GOF=”.
- BLUE

  Same format as COLOR BRIGHTNESS SETTING.

  but send cmd is “BOU”, “BOD”, “BOF” and return cmd is “BOF=”.

These functions are used to adjust color only factory line or service. Don’t open to normal user.

These functions are used to adjust picture Red/Green/Blue offset of scaler.

3.3.9 SUB CONTRAST(Range 0~75, MWCP default value is 30. But monitor’s default value is different as current source. So if you want to know current value, you have to read single set value)

Same format as COLOR BRIGHTNESS SETTING.

but send cmd is “SCU”, “SCD”, “SCO” and return cmd is “SCO=”.

This function is used to adjust color only factory line or service. Don’t open to normal user.

This function is used to adjust picture contrast gain of scaler.

3.3.10 RED, GREEN, BLUE GAIN(Range 0~80, MWCP default value is 40. But monitor's default value is different as current source. So if you want to know current value, you have to read single set value)

- RED GAIN
  Same format as COLOR BRIGHTNESS SETTING.
  but send cmd is "RGU", "RGD", "RGN" and return cmd is "RGN=".

- GREEN GAIN
  Same format as COLOR BRIGHTNESS SETTING.
  but send cmd is "GGU", "GGD", "GGN" and return cmd is "GGN=".

- BLUE GAIN
  Same format as COLOR BRIGHTNESS SETTING.
  but send cmd is "BGU", "BGD", "BGN" and return cmd is "BGN=".

These functions are used to adjust color only factory line or service. Don't open to normal user.
These functions are used to adjust picture Red/Green/Blue gain of scaler.

3.3.11 BACKLIGHT(Range 0~100, Default value = 72)

Same format as COLOR BRIGHTNESS SETTING.
but send cmd is "BLU", "BLD", "BLT" and return cmd is "BLT=".

3.3.12 COLOR TONE RED(Range 0~100, Default value = 50)

Same format as COLOR BRIGHTNESS SETTING.
but send cmd is "URU", "URD", "URE" and return cmd is "URE=".

3.3.13 COLOR TONE GREEN(Range 0~100, Default value = 50)

Same format as COLOR BRIGHTNESS SETTING.
but send cmd is "UGU", "UGD", "UGR" and return cmd is "UGR=".

3.3.14 COLOR TONE BLUE(Range 0~100, Default value = 50)

Same format as COLOR BRIGHTNESS SETTING.
but send cmd is "UBU", "UBD", "UBL" and return cmd is "UBL=".

3.3.15 SAVE COLOR

This function is for saving current setting value.

”SCB” Save Contrast and Brightness, “SUC” Save color tone R/G/B , “SFC” Save factory color control all items.

Save Concept	Description	Command	Items
Auto	Saved whenever power off	No need	Power On/Off, Set ID X, Set ID Y
Immediately saved items	Changed value is saved to EEPROM at once when value is changed by osd menu or MWCP command.	No need	- Picture Menu - Picture Mode, Color, Tint, Sharpness, Color Tone mode, Size, Mode, NR, Film Mode, Phase, H-Position, V-Position, Frequency - Set up Menu – Clock, On Timer, Off Timer, On Source, Language, OSD Tone, Key Lock - Multi Menu – H Cell Max, V Max Cell, Cell Number, H Gap Adjust, V Gap Adjust, 1:1 Gap Adjust - Factory Mode – Last Power, Aging Mode, DLC, Model, Gamma Data
Need save command items	Changed value is saved to EEPROM when save command is received. Or changed value is saved to EEPROM after 2 minutes from last changed if save command is not received.	“SCB”	Contrast, Brightness
		“SUC”	Color Tone > Red, Color Tone > Green, Color Tone > Blue
		“SFC”	Factory > Color Control > Sub Brightness, Factory > Color Control >Red Offset, Factory > Color Control >Green Offset, Factory > Color Control >Blue Offset, Factory > Color Control > Sub Contrast, Factory > Color Control >Red Gain, Factory > Color Control >Green Gain, Factory > Color Control >Blue Gain, Factory > Color Control >Backlight,

3.3.16 Read Color setting status(only for single monitor)

This function is for updating current all color menu setting status of selected one monitor. This is not available in all set or group selected.

See 3.1.1 Read (only ONE SET selected)

3.4 PICTURE

3.4.1 PICTURE MODE (USER-HIGH/DYNAMIC-MIDDLE/STANDARD-LOW/MOVIE-MILD, Default = MIDDLE(PC,DVI)/STANDARD(COMPONENT,S-VIDEO,AV))

User : User can adjust Brightness, Contrast, Color(Saturation), Tint(Hue), Sharpness value as uaer want to adjust.(Tint – at S-Video/AV input , Color/Sharpness – Component/S-Video/AV input)

High : Brightness and Contrast value is a little high in PC/DVI.

Middle : Brightness and Contrast value is Normal in PC/DVI.

Low : Brightness and Contrast value is a little low in PC/DVI.

Dynamic : Brightness, Contrast and Sharpness value is a little high in COMPONENT/S-VIDEO/AV.
This is good for dynamic picture viewing situation such moving picture as sports.

Standard : Brightness and Contrast value is Normal in COMPONENT/S-VIDEO/AV.

Movie : Brightness and Contrast value is a little low in COMPONENT/S-VIDEO/AV.
This is good for movie.

Mild : Brightness and Contrast value is a little low in COMPONENT/S-VIDEO/AV.
This is good for smooth picture viewing situation.

Send to monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	PM0	.

Send Cmd (char-3Bytes)	MODE (PC, DVI)	MODE (COMPONENT,S-VIDEO,AV)
PM0	USER	USER
PM1	HIGH	DYNAMIC
PM2	MIDDLE	STANDARD
PM3	LOW	MOVIE
PM4	MIDDLE	MILD

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1Byte)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	PIM=	0	\r\n	0x06

Data (char-1Byte)	MODE (PC, DVI)	MODE (COMPONENT,S-VIDEO,AV)
0	USER	USER
1	HIGH	DYNAMIC
2	MIDDLE	STANDARD
3	LOW	MOVIE
4	MIDDLE	MILD

Or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

3.4.2 PICTURE SIZE (WIDE-4:3-PANORAMA-ZOOM-14:9, Default = WIDE)

Send to monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	PS0	.

Send Cmd (char-3Bytes)	MODE (PC, DVI)	MODE (COMPONENT, S-VIDEO,AV)	MODE (Multi window)
PS0	WIDE	WIDE	WIDE
PS1	4:3	4:3	WIDE
PS2	WIDE	PANORAMA	WIDE
PS3	WIDE	ZOOM	WIDE
PS4	WIDE	14:9	WIDE

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	PIS=	0	\r\n	0x06

Data (char-1~3Bytes)	MODE (PC, DVI)	MODE (COMPONENT, S-VIDEO,AV)	MODE (Multi window)
0	WIDE	WIDE	WIDE
1	4:3	4:3	WIDE
2	WIDE	PANORAMA	WIDE
3	WIDE	ZOOM	WIDE
4	WIDE	14:9	WIDE

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

3.4.3 H-POSITION(only for PC input, Range 0~100, Default value = 50)

- **Up**

Send to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	HPU	.

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	HPU=	050	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

- **Down**

Send to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	HPD	.

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	HPD=	050	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

- **Edit(Number key and then press Enter key)**

Send to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Data (char-3Bytes)	Cmd end (char-1Byte)
K:	000	HPS	050	.

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	HPS=	050	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

- **Get current H-POSITION setting status**

See Read PICTURE setting status**.**

3.4.4 V-POSITION(only for PC input, Range 0~100, Default value = 50)

Same format as H-POSITION SETTING.

but send cmd is "VPU", "VPD", "VPS" and return cmd is "VPS=".

3.4.5 CLOCK(=Frequency)(only for PC input, Range 0~100, Default value = 50)

Same format as H-POSITION SETTING.

but send cmd is “CKU”, “CKD”, “CLK” and return cmd is “CLK=”.

3.4.6 PHASE(only for PC input, Range 0~100, Default value = 50)

Same format as H-POSITION SETTING.

but send cmd is “PHU”, “PHD”, “PHS” and return cmd is “PHS=”.

3.4.7 AUTO ADJUST(only for PC input)

Send to monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	ATU	.

Reply to PC

ID (char-3~5Bytes)	ACK (Hexa-1Byte)
(0)	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

3.4.8 Read Picture setting status(only for single monitor)

This function is for updating current all picture menu setting status of selected one monitor. This is not available in all set or group selected.

See 3.1.1 Read (only ONE SET selected)

3.5 IR/KEY

- POWER KEY

Send to monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	RPW	.

Reply to PC

ID (char-3~5Bytes)	ACK (Hexa-1Byte)
(0)	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

.

The following Remote control commands are available.

Send Cmd (char-3Bytes)	Remote Control Key
RPW	Power key
RSO	Source Key
RUP	Up key
RDN	Down key
RRT	Right key
RLT	Left key
REN	Select key
RMN	Menu key
RAU	Auto key
RIF	Info key

3.5.1 Factory Mode (only for single monitor)

This function is for direct entering to Factory Mode or exit from Factory Mode.

Send to monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	FMN	.

Send Cmd (char-3Bytes)	Factory Mode
FMN	On
FMF	Off

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1Byte)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	FMS=	1	\r\n	0x06

Data (char-1Byte)	Key Lock
0	Off
1	On

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

3.5.2 Read IR/KEY setting status(only for single monitor)

This function is for updating current factory mode setting status of selected one monitor. This is not available in all set or group selected.

See 3.1.1 Read (only ONE SET selected)

3.6 ETC

3.6.1 AGING MODE(OFF- FULL WHITE - FULL RED - FULL GREEN – FULL BLUE, Default = OFF)

Send to monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	AG1	.

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	AG1=	1	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

3.6.2 KEY LOCK(On/Off, Default = Off)

This function is for locking or unlocking OSD key. OSD menu key, source key, .select key, up key, down key, left key and right key don't work in Key Lock on status. But OSD power key and IR control isn't locked in Key Lock On status.

Send to monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	KLN	.

Send Cmd (char-3Bytes)	Key Lock
KLN	On
KLF	Off

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1Byte)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	KLC=	1	\r\n	0x06

Data (char-1Byte)	Key Lock
0	On
1	Off

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

3.6.3 RESET

This function is for setting default value of next item.

Picture Mode(Middle or Standard), Brightness(50), Contrast(50), Color(50), Tint(50), Sharpness(50), Color Tone(Cool2), Size(Wide), Mode(Auto), H/V-Position(50), Clock(50), Phase(50), NR(On), Film Mode(Off), On Time(Off), Off Time(Off), On Source(PC), Language(English), OSD Tone(Off), Key Lock(Off), Red/Green/Blue Offset, Red/Green/Blue Gain default value.

- Clock (Frequency): This function is for adjusting of picture quality only in PC input.

-Phase: This function is for detail adjusting of picture quality only in PC input.

-Mode : This is for force selecting of Auto/1368x768/1366x768/1280x768/1024x768 mode.
1368x768/1366x768/1280x768/1024x768 mode have very similer timming data so scaler can't detect correct timing mode automatically. And then user need to select manually.

- NR : This means Noise Reduction. This function is for reducing noise of picture in COMPONENT/S-VIDEO/VIDEO input.

-Film Mode: This function makes better video quality in normal movie picture.
Normal movie picture is originally 24 frame. When make 30 frame video 6 frame is added. Because of this picture is just a little unstable. Film mode compensate this.
This function is for only COMPONENT/S-VIDEO/VIDEO input

-On Time : This function is for wake up time when the set is power off(not ac power unplug) automatically.

-Off Time : This function is for set off time when the set is power on(not ac power unplug) automatically.

-On Source : This function is for set source when the set is power on at On time.

- R/G/B Offset and R/G/B Gain default values are different according to input source.

Item	PC	DVI	COMPONENT	S-VIDEO	AV
Red Offset	40	40	25	25	25
Green Offset	40	40	25	25	25
Blue Offset	40	40	25	25	25
Red Gain	41	40	40	40	40
Green Gain	39	40	35	35	35
Blue Gain	38	39	35	35	35

Send to monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	EIN	.

Reply to PC

ID (char-3~5Bytes)	ACK (Hexa-1Byte)
(0)	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

3.6.4 GAMMA SAVE

Send to monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	GSV	.

Reply to PC

ID (char-3~5Bytes)	ACK (Hexa-1Byte)
(0)	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

**** Gamma LUT adjust and save flow ****

1) Adjust gamma LUT level from level 0 to level 255.
2) In this status the gamma LUT data is not saved to flash rom.
3) Check the adjusted status.
4) If the adjusted status is not good , adjust again.
5) If you want to recall the previous status, AC power off and on and then you can get the previous Gamma LUT value from the flash rom.
6) If the adjusted status is good, save the adjusted gamma LUT data to flash rom.
   And then the gamma LUT data of the flash rom will changed.
   Wait until power off automatically. It will take some seconds to save.

3.6.5 FIRMWARE VERSION READ

Allows to read out the firmware version of the device. The FMW is returned as string with the following format: “V2.24 090819”

V	Version
2	The Major number is incremented in case of major functional changes, and maybe even incompatibilities of the Protocol.
.	Dot seperator

24	The Minor version number is incremented for each official release. It contains new functionality and/or bugfixes. Whenever there is a new official release the minor build number has to be increased.
_	Blank seperator
090819:Build Version	The build number is used to track different R&D versions of a minor Firmware release. It's not of importance for the end customer

Send to monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	FMV	?

Reply to PC

ID (char-3~5Bytes)	Data (char-12Bytes)	ACK (Hexa-1Byte)
(0)	V2.24 090819	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

3.6.6 DEVICE TYPE READ

Allows to read out the device type. The device type is returned the following string : "NSL-4601"

Send to monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	MDT	?

Reply to PC

ID (char-3~5Bytes)	Data (char-8Bytes)	ACK (Hexa-1Byte)
(0)	NSL-4601	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

3.6.7 MODE SETTING

This function is for setting mode detecting option of PC or DVI input mode.

1368x768, 1366x768, 1360x768, 1280x768 and 1024x768 mode has very close H/V frequency data.

So monitor can't detect mode correctly. This function set to force as selected mode in these 5 modes.

Reply is not available in all set or group selected.

Send to monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	MD0	.

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	MDE=	1	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

Send Cmd (char-3Bytes)	MODE	Reply (MDE=*)
MD0	Auto	0
MD1	1368x768	1
MD2	1366x768	2
MD3	1360x768	3
MD4	1280x768	4
MD5	1024x768	5

3.6.8 TIME SETTING

1) Hour

- **Up**

Send to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	THU	.

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	TIH=	23	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

- **Down**

Send to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	THD	.

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	TIH=	23	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

- **Edit(Number key and then press Enter key)**

Send to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Data (char-3Bytes)	Cmd end (char-1Byte)
K:	000	TIH	023	.

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	TIH=	23	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

2) Minute

- **Up**

Send to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	TMU	.

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	TIM=	59	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

- **Down**

Send to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	TMD	.

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	TIM=	59	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

- **Edit(Number key and then press Enter key)**

Send to Monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Data (char-3Bytes)	Cmd end (char-1Byte)
K:	000	TIM	059	.

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	TIM=	59	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

- **Get current Hour and Minute setting status**

See Read ETC setting status**.**

3.6.9 TIMER ON / OFF SETTING

1) On Timer

- On Time setting

Same format as TIME SETTING.

but send cmd is "NHU" / "NMU", "NHD" / "NMD", "NTH" / "NTM" and return cmd is "NTH=" / "NTM=".

- On timer on/off

This function is for setting on timer function on/off.

Send to monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	NTN	.

Send Cmd (char-3Bytes)	On Timer
NTN	On
NTF	Off

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1Byte)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	NTI=	1	\r\n	0x06

Data (char-1Byte)	On Timer
0	Off
1	On

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

2) Off Timer

- Off Time setting

Same format as TIME SETTING.

but send cmd is "FHU" / "FMU", "FHD" / "FMD", "FTH" / "FTM" and return cmd is "FTH=" / "FTM=".

- Off Timer on/off

Same format as On timer on/off.

but send cmd is "FTN", "FTF" and return cmd is "FTI=".

3.6.10 ON TIME SOURCE SETTING

This function is for setting the input source which is set at timer on.

Reply is not available in all set or group selected.

Send to monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	NS0	.

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1~3Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	NSR=	0	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

Send Cmd (char-3Bytes)	ON SOURCE	Reply (NSR=*)
NS0	PC	0
NS1	DVI	1

NS2	COMPONENT	2
NS3	S-VIDEO	3
NS4	CVBS	4

3.6.11 READ GAMMA DATA

This function is for return gamma LUT data.

This is not available in all set or group selected.

Send to monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	RGM	.

Reply to PC

ID (char-3~5Bytes)
(0)

Color (char-3Bytes)	
0x00	\r\n

Level	Fraction value	Integer value
0xFF	0x00	0xFF

….

End of Data (char-3Bytes)	
EOD	\r\n

Color (char-3Bytes)	
0x01	\r\n

Level	Fraction value	Integer value
0xFF	0x00	0xFF

….

End of Data (char-3Bytes)	
EOD	\r\n

Color (char-3Bytes)	
0x02	\r\n

Level	Fraction value	Integer value
0xFF	0x00	0xFF

….

End of Data (char-3Bytes)	
EOD	\r\n

ACK (Hexa-1Byte)
0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

3.6.12 REQUEST and REPLY "NO SIGNAL"

This function is for return no signal status of current input source when input source is changed.
This is not available in all set or group selected.

Send to monitor

Head (char-2Bytes)	ID (char-3Bytes)	Send Cmd (char-3Bytes)	Cmd end (char-1Byte)
K:	000	NSG	?

Reply to PC

ID (char-3~5Bytes)	Return Cmd (char-4Bytes)	Data (char-1Bytes)	Data End (char-2Bytes "\r\n")	ACK (Hexa-1Byte)
(0)	NSG =	0	\r\n	0x06

or

ID (char-3~5Bytes)	NACK (Hexa-1Byte)
(0)	0x15

No Signal	Reply (NSG=*)
Normal	0
No Signal	1
Unsupported mode	2

Auto reply : when change input source.(It'll take few seconds according to input source)

3.6.13 Read ETC setting status (only for single monitor)

This function is for updating current all etc menu setting status of selected one monitor. This is not available in all set or group selected.

See 3.1.1 Read (only ONE SET selected)

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